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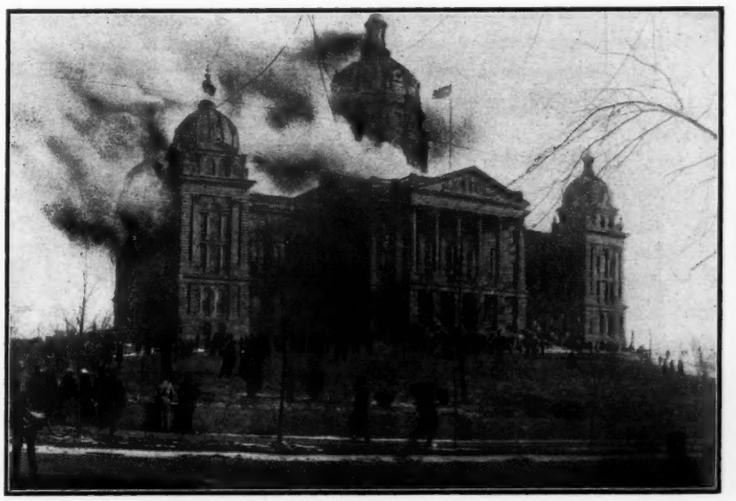
METALLIC FURNITURE*

An American Product That Minimizes Interior Fire Hazards—Its Chief Uses—Its Proper Installation

By M. S. Kelley

BACK in the early 80's a newspaper publisher in Wisconsin, having some rather valuable papers to file away, conceived that it would show horse sense to have cases made for them of metal rather than wood. From that idea has grown the metallic furniture business of to-day. Now an established industry, it is but a generation old, having started from an embryo plant in 1884. The business has grown steadily since that time, its present yearly product being counted in the millions, with a corresponding advance in the quality of the work and the variety of goods manufactured. It is peculiarly an American product, nothing approaching the lines made here being manufactured abroad, though some features of it have been attempted in other countries, notably in Germany. The industry, however, is essentially a new one, with possibilities as yet little understood, and with uses that must be fully studied before they can be adequately utilized. Incombustible furnishings have a well-defined place in the scheme for producing a really fireproof building, and without them such a structure will never be entirely attained. The correct use of metallic furniture is postulated on a clearly defined theory, and that is a properly prepared place in which to use it. In short, utilized to its fullest extent, it is employed less as a protection against fire than as a means of preventing fire. "No starting point for fire" was the basic conception of its use, and that is the idea underlying its widest employment to-day. Metallic fittings should not be so used as to be exposed to hazards that properly should be met by structural conditions. The product is distinctly fire-resisting rather than fireproof, a fact that should be kept clearly in mind in planning for its employment. That it does possess the quality of individual protection to a large degree is abundantly witnessed by the repeated instances of security afforded by it under severe tests. Its true function, however, as stated, is the complete elimination of interior fire hazards. Speaking broadly its possibilities in this direction have as yet been little appreciated, notwithstanding the constantly increasing demand for it. As a whole, architects have made but little study of the problem of reducing interior fire hazards. Up to within the past two years almost nothing on this subject has appeared in architectural or technical journals, the discussion relating to fireproofing having been chiefly confined to structural features. That is somewhat due to the fact that the owner, rather than the architect, has often passed upon the matter of equipment. Primarily, however, the question is one for the latter, since incombustible furnishings are best used only where struc-



BURNING OF THE IOWA STATE CAPITOL, JANUARY 4, 1904†

* This article is reproduced from the March issue of *Insurance Engineering*, by the courtesy of the author and publisher.—[EDITOR.

† *This means WOOD!* Such an interior fire should be impossible in a Public Building.

tural provision has been made for their introduction. Planning corporation buildings so that certain sites containing important departments shall be set apart and made thoroughly fireproof, all with proper consideration for extra weights on floors, suitable fire-stopped openings, etc., is a

PORTION OF BANKING-ROOM AT WASHINGTON, PA.*

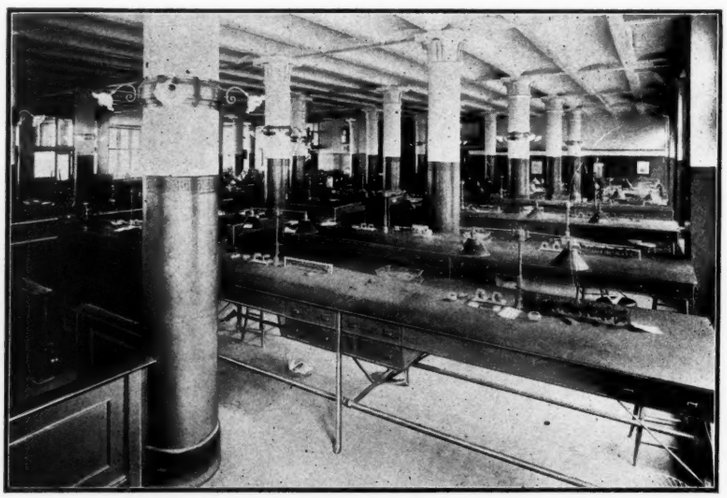
case in point. With a growing willingness among owners to meet the additional expense involved in securing interior protection, a wider study is being made by all concerned. The subject is one warranting the most serious consideration, and peculiarly demanding the hardest of hard sense.

Where Do Metallic Furnishings Stand Among Underwriters?

Practically they have no standing at present. The rate committee of the New York Fire Insurance Exchange through the territory under its jurisdiction, that is, Manhattan and surrounding territory, has made an allowance of 5 per cent. for fireproof mercantile buildings equipped with incombustible furnishings. It is believed that this is the only recognition the product has obtained from underwriters. This fact, in itself, illustrates the comparative newness of the work. With its wider employment and with an understanding of the immense decrease of interior fire hazards made possible by its use, will undoubtedly come a corresponding reduction in insurance rates where it is properly installed. The subject will eventually demand the serious consideration of underwriters, but it will first have to be presented to them by architects and property owners in tangible form. Given a fireproof department-store building, with exterior openings fully equipped to meet exterior exposure hazards, the interior properly separated by dividing walls, with fireproof doors, and the whole equipped with incombustible showcases, counters, shelving, furniture and fixtures—what reductions will be offered as against the fire-traps of to-day? Such a proposition might have seemed visionary ten years ago. Metallic furniture has made it reasonable to-day. That product offers a substitute for wood in all forms, acceptable both from the standpoint of utility and good taste. Such proposals are of moment, since they involve not only the hazard of fire but also that of life; for, in such an example as that quoted above—a great department store—is found a menace to life only too real. Immense in area, open from end to end, with great light-shafts and elevator-wells providing perfect flues, filled with inflammable materials stored on miles of woden shelves—would not a sudden outburst of fire seriously jeopardize the safety of the hundreds of young people employed? Incombustible fittings offer only one means of lessening such danger, but their value in this direction is undeniable. Their considerable adoption in merchandising establishments will be largely dependent upon the recognition they receive from insurance companies. Commercial fireproofing is, of course, largely a question of economics.

What Are the Chief Uses of Metallic Furniture?

More than in any other direction, metallic furniture has secured recognition in the equipment of public buildings. For the safeguarding of public records it is, of course, invaluable. But it is also being increasedly used to meet the demand that a public building be a fireproof building—fireproof in fact as well as name. It is supplanting wood in these buildings, in all forms; counters, partitions, desks, tables; in fact, providing for the complete equipment of them. In this it is backed by a solid public spirit. In Massachusetts the law prohibits the use of any combustible materials whatever in rooms used for public records. A similar sentiment is growing everywhere. Woodwork in any public building will eventually be an anomaly. The taxpayer who sees his court house or city hall gutted by fire, with records destroyed or jeopardized, public business interrupted, and a large financial loss entailed, will hold that architect and



COUNTING-ROOM OF HIBBARD, SPENCER & BARTLETT, CHICAGO †

officials have handed him a gold brick—and act accordingly.

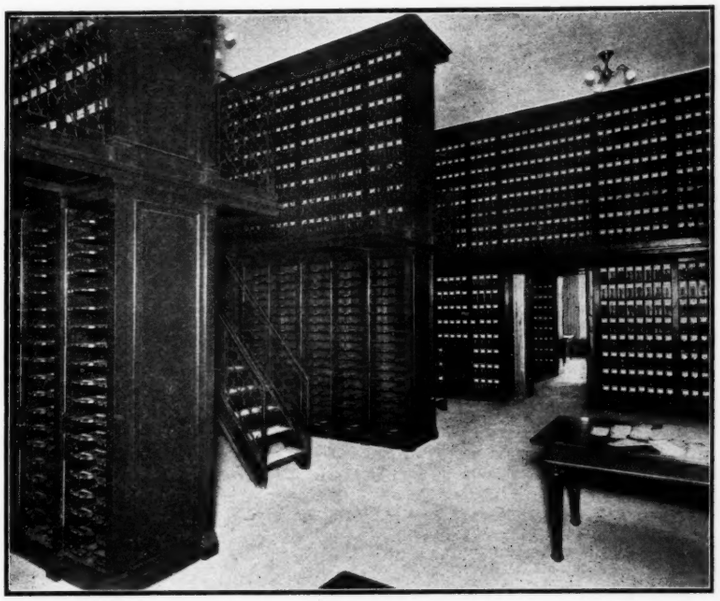
The very large growth, together with the consolidation of many important banks and corporations, has greatly

* Entirely equipped with metallic furniture and fixtures. No wooden furniture in this room except chairs.

† Size 130 feet x 126 feet. Completely furnished with metallic furniture, counters, partitions, etc., throughout.

increased the demand for metallic furniture. This is particularly true of metropolitan banks, where the volume of books and records is so great as to make it impossible to longer store them in book-vaults. The use of the latter is therefore being more and more restricted to securities and attendant records, with the great mass of books and papers provided for in metallic desks and casework under counters. This means that if anything like security is to be attained, all the surrounding fittings must be non-inflammable; in short, complete non-burning equipments. The increased demand in this direction among banks has been really remarkable, and affords a most significant illustration of how the product has cut into wooden lines. Partitions, coupon-booths, wardrobes, and the many fittings in which large amounts of wood were formerly assembled, are now being replaced by metal. Probably the demand in this direction has increased tenfold in as many years.

For ordinary commercial counting-rooms metallic furniture has been more slowly adopted. The advantages presented by its use in banking-rooms has, however, led to its considerable employment by business houses. These adoptions are due not to lower insurance rates but primarily to diminish interior fire risks, with attendant possible interruptions to trade, loss of business records, etc.



RECORD-ROOM, COUNTY COURT HOUSE, DETROIT *

The wide erection of so-called fireproof office buildings has led to a demand for a special class of this work; that is, metallic cabinets suited to withstand the small fires ordinarily looked for in these structures. Here the material is employed outside of its normal province for fire prevention, and is used directly for protection. The work has, however, a distinct and proper use here, where introduced in small offices with destricted fire areas. Isolated metallic cabinets, containing documents and letters, have thoroughly demonstrated their ability to protect their contents in small fires that have completely consumed all the surrounding wooden furniture and cases. Recommendations have appeared in print from time to time, urging that only metallic furniture be used in fireproofing office buildings, in order to secure complete immunity from interior fire. Such adoptions, however, can hardly be looked for from any action on the part of the tenants themselves. Metallic furniture costs more than wooden, and tenants, except where they desire specific individual protection, cannot be expected to install it on any co-operative plan. That owners, and eventually municipal regulation within certain zones, will insist on the elimination of wooden partitions, fixed furniture, etc., is entirely probable.

DETROIT COURT HOUSE †

Possibly one day some enterprising owner in New York may undertake the experiment of putting up a first-class fire-resistant Law Building that could be advertised with some degree of truth as being really fireproof. Built with fire-stopped window openings, non-combustible trim and doors, and rented with a qualification prohibiting the use of wooden furnture, its retnal power invites interesting speculation. Every big office fire hits the lawyer, and it is safe to say he would hunt cover if he could find it.

The modern library building offers another conspicuous example of the effective employment of this product. Fifteen years ago the use of metal work in libraries was almost unknown. Even for shelving it was looked upon with suspicion. Today steel shelving is almost universally specified for the larger buildings; the success attending the use of metal for stockrooms and in kindred capacities rapidly led to an extension of its employment in other parts of library buildings Charging counters, cabinets for card indexes, periodical cases, tables for reading rooms, cases for newspaper collections, etc., are being made more and more in incombustible forms. And there is a special fitness in this. Libraries are continually being made the repositiory of spe-

DETROIT COURT HOUSE ‡

* Illustrates the correct use of Metallic Furniture. This room is completely protected from exposure fire hazard; has incombustible trim and flooring, and is entirely furnished with Metallic Work.

† Steel shutters in record rooms, for protection against exposure hazard. These shutters are coiled in ornamental boxed window-heads.

‡ Steel fire-proof door and trim, record rooms, isolating fire-proof suites from halls, etc.

FIG. I. VIEW FROM BALTIMORE COURT HOUSE

FIG. 2. BALTIMORE COURT HOUSE

FIG. 3. BALTIMORE COURT HOUSE

cial collections, rare art works and valuable manuscripts, and the necessity for the elimination of highly combustible fittings is evident. The value of a complete non-combustible equipment was signally demonstrated in a fire occuring a few years ago adjacent to the new Law Library in the Philadelphia City Hall. A large amount of scaffolding, etc., temporarily occupying the corridor before the library entrance, took fire during the night. The flames had access to the library room, which, had it been equipped in wood, would have been gutted. As it was entirely furnished in metal, the fire met an incombustible barrier. Beyond slight damage to decorations, no injury whatever was inflicted upon the library.

Hotels as yet have made little use of metallic furniture, but its considerable adoption by the best of them may undoubtedly be looked for. "Absolutely fireproof" hotels choked with combustible work are absurdities. Particularly are metallic fixtures desirable in the working quarters of hotels; *i. e.*, about kitchens and adjacent apartments, store-rooms, locker-rooms, coat-rooms, etc., where danger from fire may be naturally looked for.

Hospitals and asylums could, of course, advantageously make use of the product in a manner similar to hotels. The non-absorbent surfaces of metallic work render it particularly desirable for hospital equipment. It has already been employed to some extent in this direction, for benches in hospital theaters, for locker-rooms, etc.

Though outside the scope of this article, it may be mentioned, at this time, as a matter of interest, that metallic furniture is now being considerably used in the equipment of war vessels. Two of the Russian warships in the late naval battles in the Yellow Sea, the *Retzivan* and the *Variag*, were completely furnished with steel furniture made in this country.

How Shall Metallic Furniture Be Installed?

Perhaps how *not* to install it is an equally pertinent question. Two illustrations will best answer both.

The view of the record room in the new court house at Detroit presents an example of a typically correct employment of metallic equipment. Metal work is here used solely to abolish interior fire risks. The various record rooms are united in suites, completely isolated from adjacent rooms and halls by reinforced partitions and adequate fire doors. Exterior

Fig. 1.—View from window in record-room (see Fig. 2), showing proximity of the recent fire to rooms largely furnished in wood. The buildings shown in the foreground (the Equitable and Calvert) acted as party walls, protecting the Court House, though the buildings themselves were completely gutted.

Fig. 2.—Record-room. Counters in foreground of wood, 15 feet away from unprotected windows. This view was made from the same spot as that shown in Fig. 1, but looking into the room. Shows records on open iron shelves surrounded by wooden counters, desks, tables, wardrobes, etc., in room having wooden floors, trim and doors, and unprotected windows.

Fig. 3.—Ruins of Law Building in front. Shows the proximity of the fire, on the west, to this Public Building largely furnished in wood and having unprotected windows.

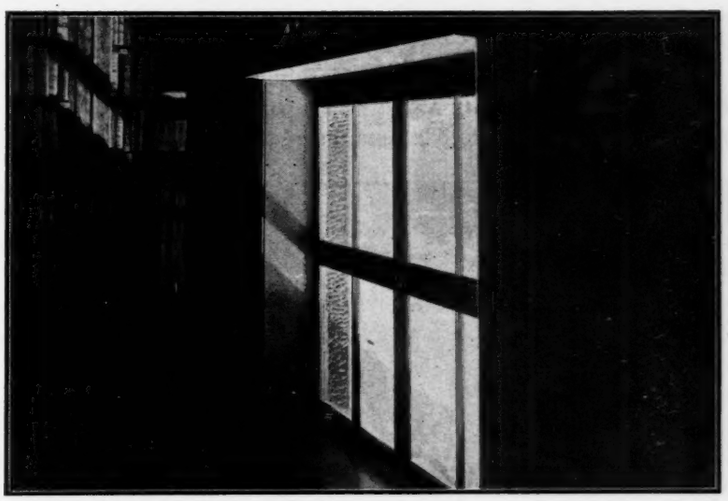
exposure hazard is provided for by heavy steel shutters coiled in ornamental boxed heads over the windows. The floors are tile or marble, the trim Keene cement or hard finish. The furnishings are simply incombustible throughout. Not half flesh and half fowl—*all* incombustible.

The view of the record room in the new court house in Baltimore presents a significant contrast to that shown in the Detroit building.

The interior of the Baltimore court house practically escaped all damage in the great conflagration. Was it due wholly to the wisdom of its builders? Apart from its heavy walls and limited window area, its good fortune is attributable to a combination of providential circumstances, rather than to anybody's wisdom or foresight. No more pointed example of the folly of building a great public repository for records *and then filling it with combustible materials open to attack on all sides* has been seen in this country for years.

Two views disclose this; both are taken with the camera practically at one spot. One view shows how dangerously near the fire was on the outside, the other the condition of a record room exposed to it. This room contained the recorded deeds of the property owners of Baltimore. These volumes were stored on open iron shelves, and surrounded—by what? By wooden desks, wooden tables, wooden counters, wooden wardrobes, wooden floors, wooden trim, and wooden doors! And to protect these cords of highly varnished oak from a fire that completely gutted a fireproof building 80 feet away, there were large sheets of unwired glass set in wooden sashes in wooden frames!

What saved these interiors from complete destruction? A fortunate shift of the wind that drove the fire from them; a series of high, fire resisting buildings that surrounded the court house and kept the fire away from it, and the heroic work of the firemen and a corps of faithful officials who stood at their posts for hours and fought the flames. Added to this was the fortunate installation, three weeks before the fire, of water curtains over the windows of the O'Neill building, which, meeting the fire at its apex at the corner of Charles and Lexington streets, successfully withstood the flames and prevented their further sweep toward the court house. But for that, to quote the *Engineering Record* of February 20, "the fire would have started on its way up Charles street, after which, when the wind turned, the court house . . . would have been attacked on two sides, and . . . probably would have been gutted. the windows of this building are an excellent exam-



BALTIMORE COURT HOUSE*

BANKING-ROOM OF INTERNATIONAL TRUST COMPANY, BALTIMORE, AFTER THE FIRE†

BANKING-ROOM OF THE BALTIMORE GUARANTEE & TRUST COMPANY, AFTER FIRE‡

* A burned-out window in Law Library fitted with temporary sash. This room was furnished with sheel shelving, heavily cased in oak for harmonious (?) effect.

† View shows Metallic Fixures intact under counters. Room badly damaged by adjoining wall falling through roof of bank. (The distortion noticed is in the photograph, and not in walls or fixtures.)

‡ Four Metallic Cases stand located at X. They completely protected their contents from injury (two illustrations opposite). The heavy wooden counters and partitions in front of them were destroyed.

ple of how to leave a supposedly fireproof preserver of records so as to invite destruction from without."

Considerable amounts of metallic furniture were installed in the record room shown and in other parts of this building. In themselves, these fixtures, of course, were as fire

STEEL DESK IN OFFICE OF AMERICAN SHEET STEEL COMPANY, WELLSVILLE, OHIO, AFTER FIRE *

resisting as those shown in the Detroit building. Yet the method of their installation, the large amounts of woodwork with which they were surrounded, the complete absence of fire stops anywhere throughout the building, and the entire failure to provide any protection against exterior exposure hazard, practically eliminated their usefulness. A more pertinent example of the danger of woodwork in a public building could hardly have been afforded. The axiom, "all must be made fireproof or nothing will be fireproof," was completely ignored.

How Fireproof Is Fireproof Furniture?

Though a paradox, this is a question frequently met with. As has been pointed out, the distinct province of metallic furniture is to prevent fire, not to withstand it. Metalwork has, however, a well-defined use in fireproof office buildings and in banks for purely protective purposes. What protection will a metallic filing cabinet afford where an adjacent wooden one is consumed? Some illustrations of the positive degree of protection afforded by the former are here presented. In each of these the surrounding wooden furniture was practically consumed. Metallic cabinets are, however, in no sense safe work, nor calculated to withstand conditions too great to be met by the latter, as in the Baltimore fire. The practicability of the use of isolated metallic casework must be gauged by the surroundings. As against wood, there is always the incontrovertible fact in its favor—it will not burn.

Conclusions.

Summing up, what may be said of some of the probabilities of the adoption of metallic fixtures in the future?

First—Governmental:

(*a*) That the use of wood or of any combustible material will be prohibited (as already in England and one State at least here) in any room containing public records.

(*b*) That its use will also later be demanded in the place of wood, entirely, in public buildings.

(*c*) That eventually municipalities will enforce the adoption of incombustible trim and fixed furniture in new buildings erected within certain zones.

Second—Private Ownership:

(*a*) That its use will be enforced by property owners offering offices for rental in buildings guaranteed to be really fireproof.

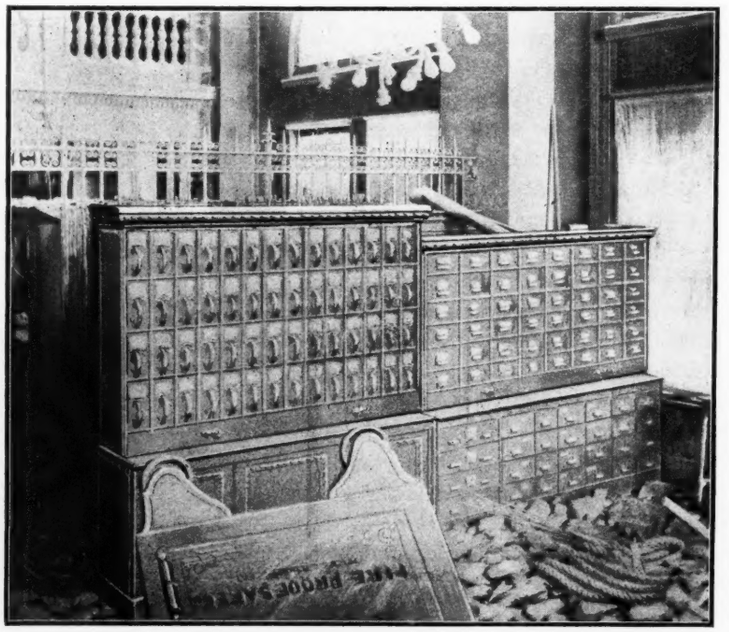
(*b*) That it will be adopted for use in large areas (as in stores), where the assembling of large masses of woodwork is particularly hazardous to property and life.

Third—Architects:

That the repeated and immense losses by fire will lead to a more careful study of interior fire hazards; the elimination of wood in public buildings; the isolation of suites designed to contain important business records, and their equipment in metal, all entailing a better understanding of the structural conditions requisite to the proper employment of the product.

Fourth—Underwriters:

A more thorough investigation of the value of this material as a means of reducing interior fire hazards, and a more adequate recognition in rates, inviting its use by property owners.



METALLIC CASES IN BANKING-ROOMS OF BALTIMORE GUARANTEE & TRUST COMPANY, INTACT AFTER FIRE

* Contents of desk entirely uninjured. All surrounding wooden furniture, including a cabinet of wooden letter files, practically consumed.

These are two of the four Cases located in opposite view at X. These Steel Cabinets were filled with important deeds, mortgages, checks, bank ledgers and paid coupons, all of which were entirely uninjured. (This view was taken under difficulties, the safe in the foreground having just fallen through six floors.)

POWER FROM MUNICIPAL WASTE

Combined Refuse Disposal, Electricity and Sewage Pumping Station at Dartford, Eng.—How an English City Saves What American Cities Waste

By Col. W. F. Morse, Sanitary Engineer

It has long been an ideal with sanitary engineers to burn municipal refuse and generate steam for use in city work, thus turning a waste product to profitable use. Although city refuse is not a wholly satisfactory fuel, much greater

NO. 1.—REFUSE DESTRUCTOR, ELECTRIC LIGHT AND PUMPING STATIONS, DARTFORD, ENG.

progress has been made in this direction by recent inventions than was at first thought possible.

Dartford, England, is a city of 18,643 population. All its municipal enterprises, electrical lighting, water supply, sewage disposal, etc., are under the direct charge of the authorities. Many methods of waste disposal have been tried, tipping on land and by sea, sorting, utilization, etc., but none have been found satisfactory. After careful consideration of the matter the Dartford Urban District Council, acting under the advice of its consulting engineers, placed an order for a destructor plant with the Messrs. Meldrum Bros., of Manchester. The type adopted was a two-grate "Regenerator Top Feed Meldrum 'Simplex' Destructor," guaranteed to destroy thirty tons of ordinary house refuse per day.

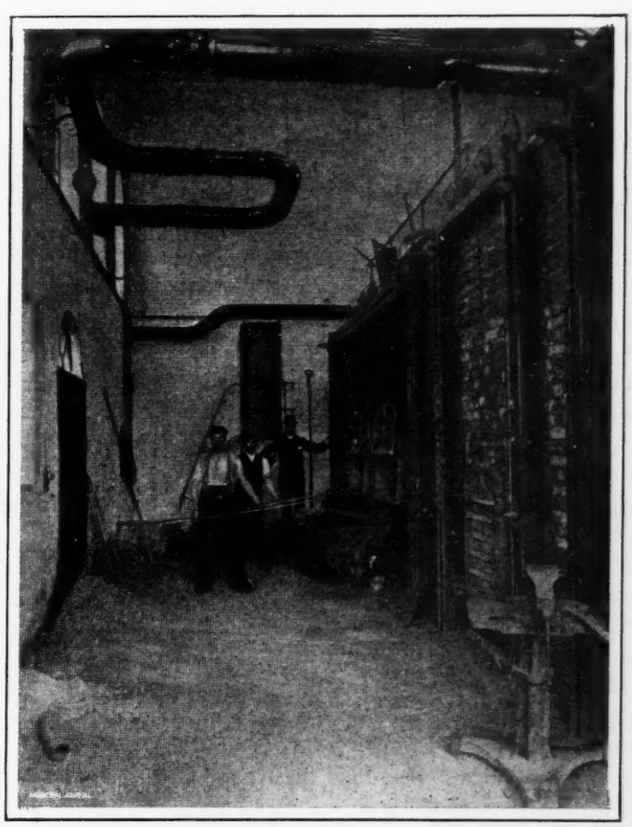
The destructor is enclosed in a building of the most substantial character, placed next to the electric light and sewage pumping station in Priory Road. The roof is of slate supported on iron principals in two bays, with a louvre to each bay, and provided with skylights. The tipping platform partly covers the boiler, and consists of a concrete arching of permanent centering of corrugated iron carried on rolled steel joists, supported on substantial cast-iron columns. Cut No. 1 shows the arrangements of the various parts of the combined plant. The building on the left contains the refuse destructor with its inclined approach. The small building to the left of the chimney contains pumps which raise the town's sewage to a higher level system. The buildings on the right are the generating stations of the electricity works, and include the engine room, storage batteries, boiler house and engineer's office.

The chimney shaft is 100 feet high, and is built to accommodate both the destructor and the electric light station.

Behind the chimney is the stack of pipes of the condenser for the electric engines. In front are the tracks of the South Eastern and Chatham Railway.

Connected with the destructor are all the latest inventions for economizing heat and power. The Lancashire boiler 30′ x 8′, of 250 h. p. has connected a Sugden steam superheater. There is also a regenerator for heating the air used in the forced blast under the furnace ashpits; a Green's economizer for heating the feed water for the boilers; a water softener and filter allowing the use of a very inferior quality of water for steam purposes; the patent Meldrum air injectors, etc. All these improvements and accessories greatly increase the power without impairing the completeness of destruction, which is, of course, the primary object of the plant.

The boiler works at a pressure of 200 pounds per square inch. In the space at the back end is placed the superheater, comprising a number of U-shaped tubes expanded into steel headers against which the hot gases impinge after passing through the boiler tubes. The whole of the steam is heated 150° above its normal temperature, and passes to the engines in a perfectly dry gaseous condition.



DESTRUCTOR FURNACES AT THE CLINKERING DOOR

ROAD TO DUMPING BOARD OF REFUSE DESTRUCTOR

After leaving the boiler the gases pass through the Meldrum regenerator which heats the air supplied to the furnace to a temperature of 350°.

The Green's economizer is a stack of cast-iron tubes arranged vertically in the flue between the regenerator and the chimney, through which the feed water, previously softened by the patent process, passes on its way to the boilers.

The destructor is fed through two openings in the roof of the furnace, the refuse falling on to a solid hearth at the back of the grate, where it dries while a previous charge is burning; it is then raked and pushed forward and spread evenly over the grate. The combustion chamber, at the end of the grates into which the gases pass before entering the boiler, and in which the dust settles, presents a large surface of incandescent brickwork to the vapors distilled. The sewage pumping plant consists of two horizontal tandem compound cylinders, 8 inches and 14 inches, with a stroke of 12 inches, having a steam pressure of 160 pounds. The normal speed is 120 revolutions per minute, but they are capable of working at a maximum speed of 120 revolutions per minute. The diameter of the flywheel is 5 feet, the driving pulley, 3 feet, and 15 inches across the face. The pumps are of the vertical three-throw piston type, and the capacity of each pump is 2,100 gallons a minute, the lift being 30 feet. The diameter of the suction pipe is 15 inches, and of the delivery pipe 16 inches. The condensers have a cooling surface of 76 square feet.

The amount of the contract was $33,190, to which was added some expert and legal expenses.

As an off-set to this expenditure there will be the saving of coal in generating steam for pumping and electric light machinery, the carting of refuse and the great consideration of a more sanitary method of disposal of the town's refuse.

The work was finished and the plant opened on February 24, 1904, and the reports of quantities of material destroyed and the exact amount of power generated are yet to be received.

This installation may be said to represent the latest and most modern type of a destructor plant where all the power developed is economically employed for three distinct lines of city work; where the saving in fuel and transportation and the sanitary performance are specially marked, and where the satisfactory results already attained can be confidently anticipated to increase and continue for many years to come.

BIRMINGHAM SUCCEEDS WITH GAS WORKS

After thirty years' experience in operating its own gas works, the city of Birmingham, Eng., has proved beyond question that a city can make a success of such undertakings if the right men and the right methods are supplied. On becoming Mayor of Birmingham in 1873, Joseph Chamberlain undertook to purchase the gas and water supplies for the city. The characteristic conservatism of the English citizen and the power of private interests had repeatedly defeated all previous attempts to put through such a project, but Mr. Chamberlain was so successful in his arguments that the vote of the Council was almost unanimous in favor of his idea. About $10,000,000 was paid for the existing works and the price of gas was at once reduced from 78 to 70 cents per 1,000 cubic feet. The profit for the first year amounted to $170,000. A steady reduction in rates has since taken place until at present the price paid for gas is 56 to 68 cents, according to consumption, while the profit for 1903 was $285,600 after interest and sinking fund had been taken care of. Since the purchase of the plant, the revenues from the undertaking have amounted to over $5,000,000, in addition to which about $3,500,000 has gone into the sinking fund. The price for gas from private concerns has been at least one-third higher than that charged by the municipal plant, and the reduction in the expense of city lighting has amounted to about $1,250,000.

One of the objections made by opponents of municipalization of such utilities is that they cannot succeed because of the higher wages and shorter hours incident to municipal plants. In Birmingham the opposite has been the case, for not only have the wages been raised, but the hours have been shortened, while the quality of gas has been greatly improved over that supplied by the private company. As soon as the works have been paid for out of the sinking fund, the price of gas will be still further reduced. At the present rate of profits, the plant will soon be free of debt. The surplus, after all expenses and charges have been taken care of, is applied to a reduction of the taxes and in this, as well, as in cheaper gas, have all the tax-payers benefited. Could the net profit be used for gas purposes alone, the price could be rduced to about 40 cents per 1,000 feet.

In April, 1891, the city obtained its electricity works from a private company for $2,100,000. A deficit was the result of the first and second year's work because of the many improvements made, but 1903 showed net receipts of $173,145, or nearly 6 per cent. on the capital. After interest and other charges were made, the profit amounted to $33,940, which was applied to depreciation. The charges to private consumers are on the flat rates of 14 and 9 cents per unit.; for power the charges are 8 and 4 cents. No such conditions can be found in an American city of equal size.

BRICK PAVEMENT CONSTRUCTION *

Some of the Neglected Details—Width of Pavement—The Sub-grade—The Foundation—The Brick—The Cushion—The Joint Filler

By Ira O. Baker, C. E.

Now a few words, only a few, about foundations that may be substituted for concrete.

Gravel Foundation

A gravel foundation for a pavement is constructed substantially as a gravel road. It is customary to dump the gravel upon the subgrade directly from wagons, and then to level off between the piles with shovels. By this process the lower part of the original piles is much more compact than the space between the piles; and rolling does not materially lessen the inequalities, since the roller, being a cylinder of considerable length rides upon the top of the piles and does not compress the gravel between them. The result is that soon after the pavement is completed the natural settlement of the gravel foundation causes the surface to be full of depression. The better and cheaper method is to level off the piles with a scraping road-grader, and then thoroughly harrow the gravel with a long toothed harrow, after which the foundation should be rolled. For the best results the gravel should be spread in layers not more than three or four inches thick. Brick pavements upon gravel foundations laid by this method have shown no depressions after many years, while those constructed with the utmost care by the preceding method with the same gravel on the same soil have been full of holes. This is another example showing that cheaper materials and proper methods intelligently applied give better results than expensive materials improperly used.

THIS PAVEMENT IS LOCATED IN THE HOME TOWN OF PROF. BAKER, URBANA, ILL. THE PAVEMENT WAS LAID WITH CLINTON BRICK IN 1895. IT IS UNDER HEAVY TRAFFIC.

Broken-Stone Foundation

A broken-stone foundation may be constructed somewhat as a macadam road. If the rock is soft or contains much fine material as it comes from the crusher, it should be screened to take out all the dust and most of the pieces up to say ¼-inch in greatest dimensions. The broken stone may be hauled to the street in wagons, and dumped upon the subgrade. It may be spread by hand with forks or rakes, or it may be spread with a scraping road-grader, the latter method being the cheaper. In spreading the stone, care should be taken that the several sizes are not separated too much, and that the piles on which the stone are dumped from the wagons are not left too high. The layer of stone should be rolled until the individual stones do not move as one walks over the surface, or until the surface stones are not easily kicked out with the feet. After the completion of the rolling, the surface of the broken stone should be impervious to the sand to be used in the cushion coat. With most stone this condition will be secured by the crushing of the top layer of the broken stone during the rolling: but if there are spots that are porous, throw on a few shovelfuls of fine stone and roll again. If the stone is hard, it may be necessary after the rolling is nearly completed to apply a thin coat of finer or softer stone. Of course the top of the foundation should finally be left smooth and of proper grade and crown.

The rolling required with either a gravel or brakenstone foundation can best be done with a steam roller, which is only an additonal reason for specifying that the subgrade shall be rolled with a steam roller. Although it is a little out of place here, this is the most convenient place to say that a steam roller is also much better than a horse roller for rolling brick. If the subgrade, and the gravel or broken-stone foundation, and the brick are all rolled with a steam roller, the cost of rolling any one of these is materially lessened, since the roller is thus used a greater part of the time.

The Cushion

Little need be said about the cushion coat. The sand for the cushion should be, and usually is, fine; and therefore it is desirable that it should be uniformly dry; since a very small per cent. of water increases the volume of fine sand to

* A paper read before the Eighteenth Annual Convention of the National Brick Manufacturers' Association, recently held in Cincinnati, O. The author, Ira O. Baker, is professor of civil engineering in the University of Illinois, Champaign, and the author of "Roads and Pavements," published by John Wiley and Sons, New York.—¶Editor.

a surprising degree, and consequently when the wet spots dry out the pavement will show a depression.

It is generally conceded that the cushion coat can be surfaced best by drawing over it a template reaching from curb to curb or from curb to a screed bedded in the middle of the street. Some contractors use a hand lute run upon screeds bedded comparatively close together; but this method does not give as good results as the longer template, owing to the difficulty of properly bedding so many screeds.

The Brick

Largely through the Association the standard of paving brick is nearly all that can be desired; and through the efforts of the individual members of the Association good paving brick can be had in nearly all localities at reasonable prices. The writer firmly believes that the manufacture of paving brick is conducted with greater skill and has reached a higher degree of success than any other part of the work connected with the construction of a brick pavement. Doubtless there will always be need to exercise care in selecting brick of uniform quality, but that need is steadily growing less year by year.

However, there are two particulars in which the writer believes that the practice of some brick manufacturers could be changed with advantage to the pavement. One of these is the rounding of the corners. It is possible that the rounding of the corner was introduced in part at least to decrease the loss while being tested in the rattler, but the round corner surely makes the pavement rougher. It is a disadvantage also in that it gives a thin edge to the joint filling, which causes it to crumble and chip off. The rounding corner is more objectionable with a cement than with a sand filler.

Some paving bricks have grooves in the flat side, apparently to give the joint filler a better hold. Obviously such grooves can be of no advantage with a sand filler, and some experiments to be referred to presently seem to indicate that they are not necessary with a cement filler. The grooves may give the filler a little freer entrance to the joint, but this effect is not great and is not needed; while the virtually wider joint is a disadvantage. But the chief objection to the grooves, particularly when they run lengthwise of the brick, is that they cause the brick to spall off from the top surface down to the groove, probably owing to the blows of the toe and heel calks of the horses' shoes. In all the grooved brick that the writer has seen this is a serious defect.

The Joint Filler

Cement grout is the best material with which to fill the joints, and the report of this Association as to the method of applying this filler leaves nothing more to be said on that subject.

It has long been recognized that the chief advantages of a cement filler was that it protected the edges of the brick from spalling off; but there is another advantage that is not so generally recognized. Experiments conducted at the University of Illinois show that if a Portland cement filler is applied in the manner specified by the committee of this Association, the layer of brick becomes a beam with approximately the same resistance to bending as a 6-inch layer of the natural cement concrete ordinarily used in a pavement foundation.

The fact that the cement filler adds greatly to the rigidity of the layer of brick does not rest alone upon a single series of experiments. It is well known that the expansion of a brick pavement with a cement filler causes it to be lifted up from the foundation, as is proved by the rumbling sound produced by a loaded wagon going over the pavement. A little investigation will show any one that the brick can not act as a true arch, but that the layer must bend under the load and touch the foundation at certain points. That the layer of bricks will thus act proves that it has a considerable resistance to bending, i. e., that it acts as a beam as well as an arch, or more properly, that the layer of brick with a cement filler acts as an elastic arch.

This fact shows that the use of the cement filler adds as much rigidity to the pavement as does the ordinary concrete foundation; and shows also that if a certain foundation is strong enough with a sand filler, it is substantially twice as strong with a Portland cement filler. Again, if a brick pavement having a sand filler and a 6-inch concrete foundation is sufficiently strong to carry the travel, a pavement with a concrete filler and a 6-inch foundation of broken stone without any cement will also carry the travel.

A little computation will show that the cost of the cement filler is about the same as that of the cement in the usual concrete foundation. Therefore, it would apparently be better economy to employ the cement in the joint filler than in the concrete foundation, since in the former case the cement gives rigidity and also protects the edges of the bricks from chipping, while the cement used in the foundation gives only rigidity. The practice of using concrete foundation and cement filler with a brick pavement has gradually grown up without any careful consideration of the fundamental principles involved. The reason is not difficult to find.

In the first place city governments far too often select as city engineer a local man acceptable to the dominant party, or to the controlling element in the party, without much regard to his fitness to plan and execute large public improvements with economy and efficiency; and as before remarked, his incapacity to grasp the fundamental principles may cost the municipality in a single improvement many times the annual salary of a really competent engineer. In the second place, it is too much the custom for one city to copy the pavement of another without due regard to the difference in conditions, and last, but not least, pavements are generally designed by engineers working upon a salary without the stimulus of individual financial interest or of competition; and hence this branch of engineering is much behind others in point of economy and efficiency. Most of you have doubtless read how American bridge engineering absolutely leads, yea even outdistances the world in India, in Australia, in South Africa, and in Egypt. American bridge building has reached this degree of excellence through the application of the principle of competition in design and manufacture. European countries have long had abundance of competition in manufacture, but have not reached even a fair degree of excellence in bridge building; for when the bridge is designed its cost and efficiency is already fixed within narrow limits. In this country, we have competition in the manufacture of pavements, but none in their design; and hence in the matter of pavements most of our

cities are comparable to European countries in bridge building. American practice in pavement construction will not be greatly improved until municipalities demand a higher order of engineering ability. The writer does not want to be understood as saying that there are no really competent city engineers, for there are many such; but he does claim that there are far too many who lack the thoroughness of knowledge and the breadth of view to effectively and economically conserve the best interests of the municipality in the construction and the maintenance of its pavements. But a discussion of this question would lead us too far afield.

In conclusion, permit a brief summary. Attention has been called to the width of pavements, in which it is believed that the construction of all forms of pavements may be greatly cheapened without materially decreasing their usefulness. Attention has been called to several matters wherein the efficiency of a brick pavement may be greatly increased without much increase in cost. Again, attention has been called to a few particulars in which the cost of a brick pavement may be considerably decreased without in any way decreasing usefulness or efficiency.

If the members of this Association approve any of these points, it is hoped that they will use their influence in securing the changes proposed; and it is believed that by so doing they will thereby aid in the general advance of municipal life, and at the same time materially increase the demand for brick pavements—a form of pavement admirably adapted to many of the streets of the great cities and the only high-class pavement available for the most of the smaller cities.

THE END.

PORTLAND CEMENT*

Its Uses in Engineering Constructions—Constitution of Cement from Chemical and Physical Points of View, Continued

By E. Kuichling, C. E.†

In the preceding three numbers of the MUNICIPAL JOURNAL AND ENGINEER the subject of the constitution of Portland cement from various chemical and physical points of view has been considered, but as the foremost investigators in these directions have not reached satisfactory agreements, it becomes necessary to continue with a few more abstracts of the latest researches.

MEYER'S STUDIES OF CEMENT

In two valuable papers, published in "Thonindustrie Zeitung," in 1901 and 1902, Albert Meyer, a chemical engineer of Bucharest, reviewed the work done by Le Chatelier, Feret, Törnebohm and others, and also gave an account of various similar investigations which he had made. To prove the existence and formation of tri-calcic silicate he made a number of cements synthetically without alumina, using in place of it different metallic oxides, such as oxide of iron, manganese, etc., which would produce a strongly colored magma or slag and thereby render the crystals of alit more distinct. The microscopical examination of the resulting clinkers showed that they were composed principally of colorless crystals, bedded in a vitreous mass colored according to the metallic oxide used. These oxides are generally much more efficient as a flux than alumina, and with the temperatures available in the laboratory, fused products containing white crystalline concretions were easily obtained.

With polarized light these crystals were found to be identical with those designated as tri-calcic silicate by Le Chatelier, and alit by Törnebohm, and from chemical considerations Meyer is convinced that they can have no other composition than tri-calcic silicate ($3CaO, SiO_2$). He also collected and pulverized enough of this substance for making a test as to its hydraulic properties and strength when mixed into mortar with water and three parts of standard sand. This mortar set very slowly, and after 3, 7 and 28 days the tensile strength of the resulting briquettes was respectively 0, 74 and 337 pounds per square inch. It thus appears that tri-calcic silicate is acted upon very slowly by water, but after several days it develops considerable strength.

In Meyer's opinion, the setting and hardening of Portland cement during the first few days after hydration is caused principally by the calcic silico-aluminates, as the calcic aluminates are usually present only in very small quantity, and are almost entirely absent in well-burned cements. The tri-calcic silicate, however, appears to be the essential agent in the subsequent process of hardening. The hydration of the latter substance results in the formation of hydrated di-calcic silicate ($2CaO, SiO_2, H_2O$) and hydrated calcium ovide, as indicated by Zulkowski, whereas Rebuffat asserts that ($2CaO, SiO_2, 0.5H_2O$) is formed; but Meyer maintains that the di-calcic silicate is in the ortho form, and not in the meta form as claimed by Zulkowski.

From numerous experiments wth solutions of cane sugar and iodine, as used by Rebuffat, Zulkowski, Ljamin, Törnebohm and others, Meyer became satisfied that these methods of separating free lime from the other compounds in the hydrated cement did not give correct results, and he adopted instead an aqueous solution of formaldehyde, which quickly dissolves the hydrated lime without affecting the other substances. He states that by this means he always obtained definite and harmonious results, and that more than one-third of the total quantity of lime in the cement never appeared as hydrate of lime, even in briquettes which had been kept for several years under water; also that the quantities of lime and water which remain fixed in the other hydrated compounds establish conclusively the presence of di-calcic silicate combined with one molecule of water, as indicated above.

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† Engineering Editor, MUNICIPAL JOURNAL AND ENGINEER.

Furthermore, he does not agree with Zulkowski in the assumption that hydrated Portland cement also contains di-calcic aluminate and di-calcic ferrite along with di-calcic s cate, as the quantity of lime set free by the process of hydration is entirely too large to admit of this hypothesis. Neither was he able in any of his experiments to separate the iron from the silica. If the alumina and iron were present in the cement as calcium aluminate and calcium ferrite, these two compounds could be dissociated by repeated application of distilled water with the formation of hydrate of lime. In such treatment, however, he never found any alumina in solution, nor did the mass become brown on exposure to carbonic acid, as would have happened if the iron had separated from the lime. The greenish-gray color of good Portland cement is not changed by the action of carbonic acid, and is due to the presence of silicate of iron in the flux.

Meyer also states that from a practical point of view free lime cannot exist in anhydrous cement of good quality for two reasons: Firstly, because it is known that an excess of lime amounting to only 0.5 per cent. causes unsoundness; and secondly, because the coarse grinding of the raw materials, or the lack of uniformity in the mixture, also produces unsoundness, even if the quantity of lime is correctly proportioned. In both of these cases the product will contain dead-burned lime, which slakes slowly in water without evolving heat, but with a gradual increase of volume. It is also known that a small deficiency of lime in the raw mixture leads to the spontaneous crumbling of the clinker on cooling. These three circumstances would indicate the necessity of making a very exact composition of the raw materials with respect to lime and silica, but such is not found to be the case in practice, and therefore Zulkowski's theory must be wrong.

The bi-calcic meta-silicate, which Zulkowski erroneously asserts to be present in anhydrous Portland cement along with free lime, occurs only in blast-furnace slag and cements made therefrom. The hardening of such slag cements is due to the hydration of this meta-silicate in the presence of calcium hydrate, for if the latter were absent the action of the water would be entirely different, and would probably result in the formation of mono-calcic silicate and calcium hydrate until the necessary quantity of such hydrate had been produced to allow the remaining bi-calcic meta-silicate to become hydrated without decomposition. Meyer claims to have proved this theory by his tests with formaldehyde, and thus establishes an important chemical distinction between Portland and slag cements. In the former the lime is combined as tri-calcic silicate, while in the latter it exists as bi-calcic meta-silicate.

He also doubts if tri-calcic silicate can be produced synthetically by burning a chemically pure mixture of the raw materials, without a flux of some kind which is capable of dissolving the lime and silica at a high temperature; but in this respect he takes issue with Newberry and others who claim that it can readily be made if proper care is taken.

Theories of Setting and Hardening

Meyer's observations on the setting and hardening of Portland cement are very similar to those of Le Chatelier and Törnebohm, abstracts of which have already been given. The initial set is caused by the hydration of the calcic aluminates, the quantity of which varies in different cements, being small in well-burned material of good composition, and relatively large in over-clayed and under-burned mixtures. This hydration is an energetic chemical action and is attended with the evolution of some heat. Owing to its rapidity, the particles do not have time enough to become closely agglomerated before the primary crystallization ceases, and the mass remains porous by the inclusion of small bubbles of air and water; hence such a quick-setting cement can never attain the same strength as a slow-setting one of good composition. The quantity of silica does not affect the setting, except when it is added as an adulteration in the form of silicate of soda or potash, or "water glass."

According to the theories of Le Chatelier and Rebuffat concerning the hydration of the calcic aluminates, the alumina dissolves first and is then immediately precipitated by the lime; and if the cement is mixed with a surplus of water, the precipitate becomes colloidal. The quickness of the reaction is favored by lime in solution. In a quick-setting cement, the action resembles that of crystallization from an over-saturated solution, but in good Portland cement it must be preceded by the decomposition of the double silicate of lime and alumina into aluminate and silicate of lime. Meyer states that hydrated tri-calcic aluminate ($3CaO$, Al_2O_3, $12H_2O$), as proposed by Le Chatelier, Candlot and others, cannot possibly be produced from an over-saturated solution, as the quantity of water absorbed by cements is entirely too small to justify this assumption; and therefore he believes that various other hydrated calcic aluminates are formed, depending on the basicity of the cement, the most probable one being (CaO, Al_2O_3, $3H_2O$) in the case of ordinary Portland cement.

Influence of Gypsum on Setting

Gypsum or sulphate of lime combines with aluminate of lime to form a double salt whose composition according to Candlot is ($3CaO$, Al_2O_3, $2.5CaSO_4$+Aq.), or according to Deval ($3CaO$, Al_2O_3, $3CaSO_4$+$26.5H_2O$). This compound is insoluble in lime water, and forms a bulky precipitate which retards the hydration of the remaining calcic aluminate, and hence also the initial set of a cement containing gypsum. An addition of only 0.5 per cent. gypsum acts appreciably in this direction, as it combines with 0.12 per cent. alumina, while 3.0 per cent. gypsum produces a very marked effect by combining with 0.76 per cent. alumina. Gypsum thus furnishes a means of increasing the time of setting of aluminous cements, but beyond a certain limit its effect upon the strength of the cement becomes injurious, as the resulting calcic sulpho-aluminate absorbs much water in crystallization, thereby tending to cause the test specimens to crack.

The True Setting and Hardening

A well-burned cement of normal composition, which is slow-setting either originally or by the addition of gypsum, requires a relatively small quantity of water for hydration and forming it into a plastic mass of the standard consistence. It remains in this condition for a considerable period, even for several hours, after which the appearance of the surface of the sample changes and setting begins. A shorter

or longer time is necessary, according as the cement is freshly ground, or has been kept in stock for some weeks. After the initial setting due to the hydration of the aluminates has taken place, the mass remains semi-plastic for another period of time, whereupon the second or true setting shows itself more or less abruptly by the hydration and crystallization of the silicates. This is followed by the hardening process in which the interstices between the crystals and other particles become filled and the cohesion is increased.

Among the reactions which occur in hardening, Meyer cites the decomposition of basic double silicates of lime and alumina into hydrated di-calcic silicate and calcic aluminate; the action of the latter on mono-calcic silicate to form a double compound, and the crystallization and carbonating of the calcium hydrate. The first-named compounds may vary in composition from (CaO, Al_2O_3, SiO_2) to ($6CaO$, Al_2O_3, SiO_2), and are the more easily decomposed in proportion as they contain larger quantities of lime. With a normal amount of lime the reaction is ($3CaO$, Al_2O_3, SiO_2 $+4H_2O$) = ($2CaO$, SiO_2, H_2O+CaO, Al_2O_3, $3H_2O$). The hydrated mono-calcic aluminate thus formed sets, but hardens only in moderate degree, and contributes little to the strength of the cement. If an excess of water is used, it has been found that after a time the calcic aluminate combines with mono-calcic silicate. The iron in the cement does not appear to play any part whatever in the setting and hardening processes.

Action of an Addition of Hydrated Silica and Alumina to Cement

By dissolving cement or hydrated lime in hydrochloric acid and then adding an excess of ammonia, a precipitate of hydrated silica, alumina and iron oxide will result; and if this precipitate is dried, pulverized and added to the original material, a great improvement in its strength when setting under water will ensue. The experiments that have been made with this substance indicate that both the silica and the alumina combine actively with the calcium hydrate that is formed soon after the addition of water to the dry mixture, as already outlined, but hitherto the character of the combinations has been studied only from a qualitative point of view, as the reactions are obscure and vary with different cements.

Meyer considers that further studies in this direction will contribute much to elucidate the theory of hardening. According to the common theory, induration is mainly due to the formation of mono-calcic silicate, while the attendant formation of calcic hydrate exerts little influence on the strength of the mass. This quantity of freed lime, however, was necessary to produce the anhydrous cement, which consists principally of a silicate of maximum hydraulicity and yields mono-calcic silicate as a terminal product after hydration. But as the strength of the mass is greatly increased by the aforesaid addition of active silica and alumina, it follows that these substances must either combine with the freed lime or that some stronger silicate or aluminate of lime, or double silicate of lime and alumina is formed.

Cements to which active silica and alumina have been added, harden more slowly in the outset than the original substance, and the more so in proportion as the quantity of material added is increased. Meyer explains this peculiarity by stating that while the constituents of the cement undergo the reactions described above, the combination of the freed calcium hydrate with the active silica and alumina proceeds very slowly until an over-saturated solution is produced from which crystals can separate. The slowness of the process and the fact that it takes place only under water, renders this explanation plausible.

Borntrager's Experiments with Cement and Soluble Silica

A brief reference may here also be made to the experiments with Portland cement and soluble silica or "water glass," which were made by H. Bornträger, of Hanover, and reported by him in "Thonindustrie Zeitung, of 1901, p. 456. The water glass (silicate of soda or potash) had a specific gravity of 1.4, and 20 parts were added to 100 parts of a slow-setting Portland cement. The dry powder was then mixed with varying quantities of water, ranging from 35 to 300 per cent., and in all cases the time of setting was much shortened. A good quick-setting material was obtained when the quantity of water was 50 per cent., and this property was not reduced by increasing the quantity of water. When, however, 200 per cent. of water was added to the mixture, free hydrated silica appeared as a gelatinous coating on the top of the mass.

From his experiments Bornträger concluded that when less than 100 per cent. of water was added to the mixture, the material might readily be poured like plaster of paris into moulds without the formation of any gelatinous coating, or the exhibition of a lustre after drying; but that with more than 100 per cent. of water both the coating and lustre would appear, and would be followed subsequently by more or less cracking of the surface. If the water glass was not added, the highly diluted cement gave unsatisfactory results, as the poured blocks tended to crack within a few days after removal from the moulds. He also found that the strength of briquettes made from slow-setting cements to which water glass had been added was inferior to that of briquettes made from originally quick-setting cements.

New Experiments of S. B. Newberry

The numerous discussions of the composition of Portland cement which appeared since the publication of Newberry's paper in 1897, induced that author to continue his experiments in the light of the additional knowledge that had been gained during several years by the researches of others, and early in 1903 the results of his new investigations were published in "Thonindustrie Zeitung," pp. 75 and 125. In this second contribution the author states that while his work is not yet completed, he has nevertheless secured many facts which lead to a clearer understanding of the subject.

Although Le Chatelier, Rebuffat, Meyer and Zulkowski were unable to produce tri-calcic silicate synthetically, Newberry states that he repeated his former experiments with the utmost care and obtained it easily by using the materials, chemically pure lime and silica, in a very finely pulverized condition, and burning them for one hour at white heat in

direct contact with the flame of a gas furnace, as previously described. The resulting clinker yielded a white powder which had a specific gravity of 3.055. On testing it for free lime by slowly adding water and noting any rise of temperature in the mixture, an increase of only 1° C. was observed; and on testing it for free silica by treatment with a solution of soda and hydrochloric acid, only 0.05 per cent. of water attained an average tensile strength of 88

These tests demonstrated that practically all of the lime and silica had combined chemically to form tri-calcic silicate, and that the clinker was not a mixture of free lime and lower basic silicates, as found by Le Chatelier and others. The reason for a successful result must be sought in the fineness of the raw materials, the high heat, and the direct exposure of the mixture to the flame.

To render the fine powder plastic, 51 per cent. of water was required. Formed into a pat on glass, it set very slowly, but after being exposed to moist air for 24 hours it attained a good set. The pats were then placed under water, whereby their hardness gradully increased; but those which were kept for some months under water in a closed vessel, became comparatively soft and could easily be crumbled by the fingers. Pats kept for 24 hours in air and then subjected to steam for 3 hours in a closed vessel, became quite hard and did not crack or warp. Small briquettes mixed with 35 per cent. of water attained and average tensile strength of 88 pounds per square inch after 7 days and 162 pounds after 28 days.

It is thus shown that tri-calcic silicate, produced at a heat little higher than that which is used in burning cement on a commercial scale, possesses strong hydraulic properties and is sound or constant in volume, but is inferior to common Portland cement in hardness. This inferiority may be due to differences in physical characteristics, such as the non-crystalline structure of the tri-calcic silicate and the large quantity of water required to make the powder plastic. The latter feature causes the mass to be porous and prevents it from hardening properly.

The interesting experiments of Dr. W. Michaelis with fused Portland cement, induced Newberry to melt some of his tri-calcic silicate in the flame of the oxy-hydrogen blow pipe. The result was a mass of pearly lustre which was examined microscopically by Prof. G. F. Kemp of Columbia University, and found to be identical optically with the substance described by Le Chatelier as crystallized tri-calcic silicate and by Törnebohm as alit. On grinding the fused mass a dense white powder was obtained, which had a specific gravity of 3.022 and required only 24 per cent. of water to make it plastic. In moist air it set hard in 3.5 hours, hardened well in water and exhibited the same properties as the best Portland cement. In steam and boiling water, a pat remained adhering to the glass without cracking. Tensile strength tests were not made as the quantity of material available was too small.

In attempting to produce di-calcic silicate synthetically by burning the mixture to incipient fusion, the resulting clinker always crumbled to powder spontaneously on cooling. Schott asserts that this will not happen if the raw materials are ground sufficiently fine, or if the crumbled substance is ground and re-burned, but Newberry was unable to obtain a coherent cool clinker by these means. On quenching the white-hot clinker in water, a coarse powder resulted which exhibited a loss of only 0.63 per cent. on ignition after being dried. Both the cooled and the quenched material possessed very slight hydraulic properties, as it remained soft after exposure to air for 24 hours and then being kept under water for several months. In view of his experiments, Newberry considers that the assumption of Zulkowski, Meyer and others that di-calcic silicate exists in two isomeric forms, one being an active basic meta-combination and the other an inert ortho-combination, is unwarranted.

(*To be continued.*)

FACTS ABOUT JERSEY CITY

Some interesting statistics were given in the Board of Trade *Review* of Jersey City, N. J., concerning that municipality. The city occupies an area of twenty-three and one-half square miles and has a population estimated at 220,000 In 1850 only 7,000 people were residents of the city. The tax rate, which Jersey Cityites are compelled to pay, amounts to $19.57 per 1,000, to which must be added the county and school taxes of $7.93. The real estate is assessed at $88,328,930, the personal property at $12,221,096, and the railroad property, exclusive of franchises, at $25,000,000, giving a total of $125,550,026. There are sixteen banking institutions, thirty-four public schools, seating 25,000 pupils and valued at $2,000,000, and sixteen private and parochial schools.

A boulevard, 100 feet wide, runs the whole length of the county, a distance of eighteen miles. About fifteen miles of streets are paved with asphalt, seventy-seven with block, seventeen with macadam, the total mileage of streets both improved and unimproved being 201. The park area is small, there being only eighteen acres, divided into seven parks and valued at $485,500, but at least 100 acres are to be laid out in 1904 and an extensive park system started.

In public buildings the city does better, its city hall covering an entire block and costing with site $900,000. One of the finest public libraries in the State is in Jersey City and there are fourteen branches to this library in the city. The water-works has been in the hands of a private company, but a new system costing $7,000,000 has been about completed and will be turned over to the city soon. A maximum supply of 70,000,000 gallons a day has been calculated on, which will be ample for some time to come.

Protection from fire is afforded by fifteen steam engines, three chemical engines, four trucks, and a good force of men. The police force consists of about 350 men under the command of Chief Benjamin Murphy, one of the foremost police officers in the country.

BRICK VS. ASPHALT PAVEMENT

Topeka's Experience with Both Kinds of Pavement—Heavy Expense Necessary for Asphalt Maintenance—Brick Repairs Amount to Nothing

By P. A. Lovewell

To the smaller city, which, as a rule, sails pretty close to the limit of its financial resources, the question of replacing worn-out pavement is one of the most perplexing. If the pavement is not replaced, and the city takes any pride in the appearance of its streets, it requires a very large and rapidly increasing expenditure for repairs which is noxious to the general taxpayer. If it is replaced with new pavement, the law in most states places the burden on the abutting property, the owners of which are loth to assume such a burden as long as it is possible to put off the responsibility for maintenance.

Topeka, Kan., a city of 40,000 population, is face to face with such a situation. In 1887 and 1888, Topeka laid 194,000 square yards of asphalt on about seven miles of its main thoroughfares. The larger portion of this is rapidly going to pieces, in spite of the expenditure of $54,000 for repairs since the expiration of the 5-year guarantee. In 1902, the repair bill was $5,200, in 1903, $7,500, and, for economy's sake, only the worst holes were repaired in each of these years. To put the pavements into a fair condition at the present time would cost $20,000 and as much more as could be spared. The pavement was laid by The Barber Asphalt Company, and all the repairs have been made by the same concern.

As originally laid, the pavement gave good service, but where the Trust has tried its hand at patching, the results have been uniformly unsatisfactory, whether done with surface heaters, or by cutting out rotten places and replacing with new asphalt. In some instances, patches put down by the Trust have gone to pieces within a few months. Topeka is thoroughly dissatisfied with Trust methods and is looking for a way of escape. Many of the city officials believe that the only escape from the dilemma lies in the immediate cessation of all dealings with the Asphalt Trust, and the resurfacing of all the asphalt paved streets with some other material.

Repairing with Pulverized Stone.

In line with this policy, the city is now repairing the worst holes in the pavement with pulverized limestone. It has been found that by the action of water and wagon wheels, the limestone soon becomes almost as solid as cement, retains its place in the cavity and makes, on the whole, a very satisfactory and inexpensive temporary repair. Although not as smooth as an asphalt patch, it seems to endure as well as most of the patching which the Trust has done in the city.

Mayor W. S. Bergundthal says, in speaking of the situation: "Being one of the first extensive users of asphalt in the country, Topeka is slow to repudiate this form of pavement which possesses so many excellent qualities. Our people rebel at the idea of giving up the asphalt pavement, but the sentiment is strong that the city can not afford to pay out so much money for the class of repair work which has been done here.

"On several of our main streets, the asphalt has become reduced to shreds and patches. I doubt the wisdom of further repairs under our contract with The Barber Company. We have no special funds devoted to pavement repairs, and whatever work we do in that line must be paid for out of the general fund, at the expense of the other departments of the city administration. When the time comes for a complete renewal of our asphalt pavements, it will rest with the property owners to decide what material they will have substituted for asphalt."

City Engineer James F. McCabe says: "Most of our asphalt streets are in a deplorable condition. In my judgment, the city should either appropriate sufficient money to put the asphalt in good condition, or else abandon it and afterwards resurface with some other material."

WEST 10TH STREET, TOPEKA, KAN.

Brick the Cheapest Substitute

If it comes to a question of resurfacing with some other material besides asphalt, Topeka will naturally turn to brick. There are already twenty-two miles of brick pavement in the city, with forty-five blocks more under construction. Some of it has been down thirteen years, and nothing has ever been spent for repairs. Topeka makes its brick at home, has an inexhaustible supply of sand within the city limits, and lays two courses of brick on sand foundation for from $1.13 to $1.20 per square yard.

To remove the asphalt surface from the worn out pavement and replace with one course of brick on the old concrete foundation, would be comparatively inexpensive, though it might present some engineering difficulties. One course of brick on a thin cushion of sand would be about two inches thicker than the existing asphalt surface. In order that the

top of the pavement might not come too close to the top of the curb, it would be necessary to cut out part of the concrete in the gutters, giving more crown to the street. As all the asphalt pavements in the city are from sixty to ninety feet wide, this would not be a serious inconvenience.

Topeka has, therefore, to some extent mapped out for itself a way of escape from the Asphalt Trust. While it may later be decided to resurface the streets with asphalt and not brick, it can be safely asserted that it will be some form of asphalt which the Trust does not control.

MEETING OF NATIONAL MUNICIPAL LEAGUE

THE tenth annual meeting of the National Municipal League, which was held at Chicago, April 27-29, was not largely attended, but the quality of the delegates more than made up for the lacking in quantity. Dr. Howard S. Taylor, city prosecutor, welcomed the assemblage in the absence of Mayor Harrison, and called attention to the three great difficulties standing in the way of efficient city government: The liquor traffic, the war between capital and labor, and the private ownership of public utilities such as lighting and street railways. First Vice-President Charles Hichardson, of Philadelphia, responded and added a few other difficulties in the way of municipal government, such as a weak minority party, the possession of State and local machinery in the same hands, poor election machinery, and long franchises. Secretary Clinton Rogers Woodruff, also of Philadelphia, delivered his report in the form of an address entitled "A Year's Disclosures and Developments," which was very optimistic in tone. He said that Chicago occupied a unique position through its steady fight for a good city council. Other cities have turned out one set of rascals to let others creep back, but Chicago has kept the rascals out. Yet, in certain ways, Chicago has lagged behind other cities. He called attention to the fact that "prominent citizens" in different cities are wont to interfere in the case of such officials as have been caught in wrong-doing and strive to prevent their punishment. He touched upon conditions in Philadelphia, Boston, Harrisburg, Baltimore, Indianapolis, and Kansas City, Mo., showing how the friends of good government in these cities have been making progress.

"Municipal Taxation" was the subject of an address by Mr. Lawson Purdy, of the New York Tax Reform Association, and Chicago speakers. A method of raising State revenue that was presented, was to apportion the amount needed among the different cities according to their respective local revenues. Thus, if a city has a revenue of $5,000,000 and the combined revenues of the State aggregate $50,000,000, then that city should pay 10 per cent. of the amount needed by the State. Every city should have the right to exempt from local taxation such classes of property as the voters desired. These reforms would do much to lessen existing tendencies to undervaluation and inequalities of assessment. Incidentally this discussion brought out the fact that Ohio has one of the worst constitutions with respect to taxation in the country, and that Massachusetts, Connecticut and New York have taken the lead in not having in their State constitutions such limitations on the powers of the legislature in tax matters as stand in the way of progress in most states. In New York City the assessment upon every piece of land and every building will be soon published by subdivisions of the city and sold for a few cents to any citizen. Such a simple matter as that would go a long ways toward improving the assessment of real estate in any city, and be less of a hardship to many taxpayers.

The progress of uniform municipal accounting, which the League has fathered, was shown to have made good progress during the year. The need of some system of uniformity was well brought out by Mr. L. C. Powers, chief statistician of the Department of Wealth, Debt, and Taxation of the U. S. Census. He said it was almost impossible to rely upon the printed reports for any clear and satisfactory exposition of city business.

The chief attention of the League was concentrated upon the vital problem of improving our system of nomination to office. Many elaborate papers and exhaustive studies of this subject were presented by such men as Horace E. Deming, of New York; Dr. Chas. B. Spahr, also of New York; George W. Guthrie, of Pittsburg, and others.

A carefully prepared draft of a proposed law was presented for criticism.

The gist of the proposed law is that there shall be a registration before every election and at that time every voter shall have the opportunity to cast a secret ballot for whomsoever he desires to nominate. All parties shall vote on the same day and under the same provisions as in the best Australian ballot laws and under the supervision of State officials. The State shall print the ballot for this nominating election, as well as for the final election. On this ballot would appear the names of those who had received a certain number of petitions which had been lodged with the State officials. On this nominating ballot every would-be candidate could have printed not to exceed five words, descriptive of his policies or platforms. Many safeguards are provided against abuse and to secure fair play. If this reform could be joined to a great reduction in the number of men to be elected to office at any one time this method of nomination reform, which, in a modified way, has been rapidly advancing already in Minnesota, Wisconsin, Michigan and the South, will have a great chance for large development. It would do much to develop nonpartisanship in municipal affairs.

An address on "University and Collegiate Instruction and Research in Municipal Government" was prepared by Dr. L. S. Rowe, of the University of Pennsylvania, but read by Secretary Woodruff. The paper urged that the League appoint a committee to conduct in the colleges investigation into "The Relation of the City to the Street Railway, Gas and Electric Light Services." Lincoln J. Steffens talked about the crusade of Circuit Attorney Folk, of St. Louis, and papers were read by H. N. Wheeler, of Cambridge, Mass., on "The Municipal Situation in Cambridge" and by J. P. Brown, of New Orleans, on "What a Partisan Administration Has Done in New Orleans."

INCANDESCENT GAS LIGHTS IN ENGLAND

SOME interesting observations and opinions upon the street lighting system of England are contained in a report which has just been made by the Watching and Lighting Committee of the Glasgow Corporation. In December a subcommittee was appointed with power to visit other cities for the purpose of inspecting and reporting on the lighting of their public streets. As a result, a deputation, accompanied by principal officials, visited Leeds, Bradford, Sheffield, Liverpool, London, and Brighton.

The points which impressed the deputation were:

(a) The almost entire unanimity of opinion both of representatives of the different corporations and their officials in regard to the advantage to be gained by the adoption of the incandescent system of gas lighting for street illumination and the consequent abolition of flat-flame burners.

(b) The necessity for the adoption of a type of lamp specially suited to the above system of lighting, such lamp being indispensable, both for the proper protection of the incandescent fittings (particularly the mantle), and also for obtaining the best illumination available for the amount of gas consumed.

(c) The need for supplying the burners adopted with sufficient gas to obtain the best illuminating result therefrom. In every city visited the amount of gas used per burner is considerably greater than what is at present used in Glasgow.

(d) The great benefit derived from the adoption of the system of utilizing a staff of men for the maintenance of burners and mantles, and also for inspection purposes.

(e) The system of adapting the illuminating power to the requirements of the different classes of streets, and also of increasing such illuminating power at street crossings.

(f) That in no city visited was the electric arc lighting superior to what we have in Glasgow.

(g) The unsuitability of electric incandescent light for street illumination.

(h) The generally low standard of street lighting in Glasgow compared with what we saw in other cities, with the exception of the street lighted by electricity.

The sub-committee made the following recommendations:

(1) The total abolition of all flat-flame burners.

(2) The adoption of an approved system of incandescent gas lighting for all streets in which gas is used.

(3) The abolition of the present form of globular lamp.

(4) The adoption of a suitable pattern of square lamp so that full value may be obtained from the incandescent burners, and the cost of maintenance for mantles, lamps, etc., kept as low as possible.

(5) The lighting of all car routes (not lighted by electricity) by two-burner lamps, the burners used to be No. 4 "Kern" or other suitable burner, consuming three and three-quarter cubic feet per hour.

(6) The lighting of all main streets, other than car routes, by single-burner lamps, with No. 4 "Kern" or other suitable burner, consuming three and three-quarter cubic feet per hour, with double-burner lamps at all important crossings.

(7) The lighting of all other streets by single-burner lamps, with No. 3 "Kern" or other suitable burners, each consuming 2.8 cubic feet per hour, with double-burner lamps to be erected at crossings where necessary.

(8) The use of anti-vibrators in all lamps erected in those streets where heavy traffic prevails.

(9) That a staff be organized for attending to the maintenance of burners and mantles, and also for inspection purposes.

(10) That at street crossings transparencies indicating the names of the streets at the corners of which the lamps are situated be inserted in the lamps.

Mr. James D. Borthwick, Police Treasurer, basing on statements furnished to him, estimates that the initial cost of the installation recommended would be $108,220, which, spread over eight years, would involve an annual charge of $13,530. At 3½ per cent. the interest charge on this might be taken as amounting, for the first year, to $3,800, falling by, say, $475 per annum, as one-eighth of the total amount was written off yearly. As regards the gas supply, with double-burner gas lamps on all car routes consuming, each burner, three and three-quarter cubic feet per hour, the annual consumption of gas at 52 cents per 1,000 cubic feet would amount to $116,725, while under another scheme, which provides for each burner in the double-burner lamps on car routes consuming only 2.8 cubic feet per hour, the annual cost of gas would be $108,980. As compared with the present consumption of gas for public lighting, which costs $76,270, the additional cost of the former scheme would be $40,455 and of the latter $32,610. Mr. Lewis estimates that the adoption of the recommendations will necessitate the addition for lighting, cleaning, and extinguishing purposes of five men, and for cleaning and replacing burners, mantles, and chimneys, an outside staff of eight men (including two inspectors) and an inside staff of four boys. The addition to the wages bill he estimates at $5,100 per annum. For replacements of mantles and chimneys (six mantles and one and one-half chimneys per annum per burner) for 8,200 additional burners, bringing up the total from 9,800 to 18,000, the estimate is $2,400 per annum. Thus the whole immediate charge falling on the rates would be, under the first scheme of gas consumption, $65,285, and under the second $57,540 per annum.

There are at present 799 electric arc and 14,753 gas lamps utilized for the lighting of public streets. Of the former, 749 are twelve ampere lamps, and fifty of seven and one-half amperes. Of the gas lamps, 8,556 are fitted with single incandescent burners, consuming two and one-half cubic feet per hour; 595 with double incandescent burners, each consuming two and one-half cubic feet per hour; the remainder, 5,602, being flat-flame burners, mainly consuming two cubic feet per hour. The quality of gas supplied is twenty candle-power, at the price of 52 cents per 1,000 cubic feet. The mileage of public streets, according to the register kept by the Master of Works, is 221 miles; but in addition there are other streets lighted as public which are not on the register. —*Municipal Journal*, London, Eng.

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New York's Poor Pavements

WHEN the facts, that over $11,000,000 were appropriated for new pavements and resurfacing worn out pavements in New York City last year and that an equal or greater amount will be appropriated for the current and successive years, are considered in connection with the wretched condition of the streets of New York, it is not at all unreasonable to conclude that the people who foot the bills are not getting the worth of their money. Only a cursory inspection is required to show that a vast majority of the streets are in poor condition, and, in many instances, paved with materials ill adapted to the needs of the traffic.

For example, nearly one-third of New York's 2,527 miles of streets are unimproved. And of the 1,765 miles of paved streets 218 miles are paved with cobblestones, than which a worse pavement was never laid. No other city in the United States, except Baltimore, has more than 70 miles of this sort of pavement. Even Chicago has less than three miles of cobblestones and slow Philadelphia has gotten rid of all but forty-three miles of that kind of paving material.

More than one-fourth of New York's paved streets are covered with granite or Belgian blocks, and the Highway Department continues to award large contracts for the same sort of pavements to be placed on important streets. For instance, contracts have just been awarded for the paving of Elm street with granite blocks from Howard street to City Hall Place and the repaving of Broadway from Canal to Vesey street. If there were no other kind of block stone pavement available at an equal or less cost, there might be some excuse for the use of granite or Belgian block, but with an abundance of a better material found within the borders of the Empire State, it is difficult to discover a good reason for the use of granite. This better material is known as Medina sandstone and has been used for many years in several of the prominent cities of New York, and in Western cities as well, with much greater satisfaction as to economy and when traction and noise are considered. Granite block pavements soon become smooth, slippery, turtle-back or round in shape, and most dangerous to traffic. More horses are injured every day in New York on granite block pavements than on slippery asphalt. It is a disgrace to the first city in the United States to have so many miles of granite block pavements, when it can secure a better pavement in Medina stone, for less money. Rochester has, on its busiest thoroughfare, a Medina stone pavement that is as even and in almost as perfect condition as when it was first laid fourteen years ago, and the annual cost for repairs has been trifling.

Another fact will astonish the observer, viz., the small amount of brick and modern wood pavements used. There are more miles of brick pavement in use in the cities of the United States than of any other form of pavement except asphalt. It has given eminent satisfaction wherever it has been properly laid, except for slipperiness and noise, but in these it is preferable to granite, but in spite of its good qualities New York has but twenty-one miles of it in use. And there is even a smaller amount of wood pavement. In English and European cities the treated wood block pavement—which is inferior to the creo-resinate and kreodone wood block pavement made in this country—is among the most used paving materials and gives general satisfaction. As constructed here the wood block pavement has been shown to have greater durability than granite and in other particulars it is incomparably better than granite, its only defect is its slipperiness.

The more than 300 miles of asphalted streets to be found in New York City furnish additional evidence of the lax methods which obtain, either on the part of the contractors or the city, or both, for this style of pavement is always notoriously in a bad state of repair in some part of the city.

The Highway Department spurred on by the daily press makes sporadic efforts to enforce the specifications under which the asphalt pavements were laid, but the breaks in the pavement multiply more rapidly than they can be repaired, which continuously leaves a large proportion of this kind of pavement in an unsatisfactory condition. At the present time, it is perfectly noticeable to one traveling on a street car from 59th to 125th street, that there are not a dozen blocks of asphalt pavement in all that distance which are not in need of repairs. On 97th street, where the maintenance guaranty has expired, between West End and Amsterdam avenues, there are thirty breaks in the asphalt surface which measure ten by twenty feet and several others, eight by ten feet, all of which makes the street dangerous. Similar conditions can be found in many other localities.

Here is a chance for the various civic improvement organizations which are anxious to better local conditions. "The City Beautiful" must be built upon a good foundation, and permanently improved streets, including the pavement, curbing and sidewalks, are an absolute essential to "The City Beautiful." It is utterly absurd to talk about

beautifying this great city until more careful attention is given to the expenditure of the more than $11,000,000 annually in the betterment of its streets. The first step toward a more beautiful city is to have it well paved and cleaned.

We would suggest to the Improvement Commission, lately appointed by Mayor McClellan, that it send out a call to the leading organizations which have anything to do with the solution of the civic problem, such as the Municipal Art Society, the Society of Municipal Engineers, the Merchants' Association, the Architectural League, the Chamber of Commerce, the Board of Trade, the American Society of Civil Engineers and kindred societies, a request to appoint three members to attend a conference, whose sole purpose would be the consideration of the various problems connected with the streets of Greater New York. This conference could make its report to the Commission and it could, in turn, report to the Mayor with specific recommendation, which would enable the city to achieve something definite.

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Water Famine Imminent in New York

THE city of New York, the great metropolis of this country, for its supply of water is dependent upon rain water collected in storage reservoirs, it having no lakes or rivers now available.

The Boroughs of Manhattan and Bronx are supplied from reservoirs on the Croton River. The natural flow of the river was insufficient to supply the city over sixty years ago, when, in 1843, the first storage reservoir was made by building the old Croton dam. Since then, as required, six other reservoirs have been constructed upon the tributaries of the river. Rain-water is collected in these reservoirs during the wet seasons, to be used during the summer and fall. The agregate capacity of the reservoirs is forty-two billion gallons, or one hundred and fifty-three days' supply for the city at the present rate of consumption of two hundred and seventy-five million gallons per day.

A year of normal rainfall could not now pass, without the city experiencing a deficiency of water, owing to the enormous quantity consumed. In proof of this statement reference is made to the alarming condition that existed on March 1st, 1901. On that date the reservoirs contained but fifty-six days' supply of water, and very grave fears were entertained that the reservoirs would not be filled for use during the summer. And this condition occurred not after a year of light rain fall, but after a year when it amounted to 49.46 inches, which was the average of the last thirty-four years. Since 1901, the consumption of water has increased twenty-three millions of gallons per day, this increased consumption applied to the condition of the reservoirs in the winter of 1900 and 1901 would have entirely exhausted the supply of water.

The city was singularly blessed in having an unprecedented fall of rain to fill the reservoirs in the months of March, April and May, 1901, otherwise there would have been a deficiency of water that summer. The rain fall of those months amounted to 23.92 inches, while the average of the same months in the last thirty-four years, had been only 11.69 inches, or less than half, and the nearest approach to 23.92 inches in the same months was in 1893 when it amounted to but 16.25 inches.

Since the reservoirs were filled in the spring of 1901, the city has been further blessed with sufficient water, by having three years of the greatest fall of rain since before 1870, which date is as far back as the record of the rain fall in the Croton valley has been kept. The rain fall per year for the three years commencing with 1901, have been 62.64 inches, 52.86 inches and 63.34 inches, being an average of 59.61 inches. This is 20 per cent. higher than the average of any three succeeding years since before 1870 and it is 41 per cent. more than the low rain fall of the three years commencing with 1874, when it averaged 42.24 inches.

Even though the new Croton dam were now completed, with two or three years of light rain fall, the city would be in a perilous condition, because of a scarcity of water, as the entire yield of the Croton River water shed would be insufficient to meet the demands of the enormous consumption, which has increased 50 per cent. in the last eight years. Owing to the time that it would take to complete new work from another source of supply, it is imperative that prompt action should be taken. New York should follow Boston's good example and provide a water supply which would be ample for all demands for many years to come.

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Danger in Street Dust

COMMISSIONER WOODBURY, of the New York Street Cleaning Department, recently stated that five years' work as a street cleaner in New York made the average person a consumptive. When we consider that every member of the street cleaning force must pass a physical examination before he can be admitted into the service; that the labor is all performed in the open air, and that in English and European cities the street sweepers show the smallest mortality from tuberculosis and other diseases among the laboring population, it may well be asked, what the differing conditions are in American cities, for the experience of New York is not exceptional on this side of the Atlantic.

This question has been thoroughly and intelligently discussed from the physician's standpoint and the New York *Medical Journal* pertinently remarks:

"To the close observer it is not difficult to find an explanation. In well regulated European cities the streets are frequently sprinkled before they are swept; here the sweeping is almost invariably done dry. Now, it is not the tubercle bacillus alone which renders our street cleaners consumptive, but it is the constant inhalation of all kinds of dust and the consequent irritation of the pulmonary surfaces, which make the invasion of the germ of tuberculosis more easy. The sweeping of streets in a dry state should be considered as a crime against our fellowmen. It is not the air, but the dust in the air, which renders New York such a dangerous place, particularly in summer, to people predisposed to pulmonary troubles. While, as a natural consequence of being in closer proximity to the dust, the street cleaners are the first to suffer, the citizens at large who are obliged to remain in New York during the summer months suffer also to a considerable degree."

What our mayors and aldermen need to do in the various

American cities, not New York alone, is to provide for the use of up-to-date street sweeping machinery. Foreign cities make a much larger use of machines in cleansing the streets than is done in the United States. American manufacturers are well in the lead in turning out machinery that is perfectly adapted to the requirements of a clean city, and there is no excuse even for the small municipalities for not using the modern sprinkler, sweepers and other machinery needed in the cleansing of the streets. It is up to the mayors and the aldermen to provide the necessary equipment for this work and in so doing they will not only make life in every municipality more enjoyable but also decrease the death rate.

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Municipal Fourth of July Celebration

Chicago proposes to take the celebration of the Fourth of July out of the hands of the small boy and to run it as a municipal entertainment, with Mayor Harrison, the city police and prominent citizens in active charge. This step is taken in order to prevent the numerous accidents which occur with an unrestricted celebration. The plans outlined are as follows:

When the schools close for the summer vacation in June every pupil will receive a framed copy of the Declaration of Independence. On the morning of the Fourth there will be open celebration in the parks, playgrounds and vacant lots of the city. At each place the children will be chaperoned and watched over by one policeman furnished by Chief O'Neill, a fireman furnished by Chief Musham, a doctor furnished by Dr. Reynolds of the municipal Health Board, a teacher designated by Superintendent Cooley, and one member of the Illinois Naval Reserves in uniform.

There will be a liberal supply of small firecrackers for the little folk, who will be taught how to use them with safety to themselves and others. The policemen on detail will see that the terms of the ordinance are observed. The firemen will keep a watchful eye out for fires. The doctors will be on hand with bandages and ointments for instant application in case there should be accidents despite the precautions taken to avert them. The teachers will try to maintain decorum among the children and keep them out of harm's way. The naval reserves will give the older lads instructions in the use of firearms. Firecrackers will be free of charge.

In the afternoon there will be concerts in the parks by National Guard bands, a grand promenade in Michigan avenue, and probably a display of daytime Chinese fireworks. A division of naval reserves will be detailed on the lake front with Springfield rifles and blank cartridges to give young men lessons in the use of the guns.

In the evening there will be a sham battle on the lake between the United States boat *Dorothea* and another vessel which has been out of commission. There will be a display of rockets, signals and searchlights, together with naval manoeuvres. This part of the programme will end with the blowing up of the old ship, with a torpedo. As a climax to the day's festivities there will be a display of fireworks at two or more points in the city, so located that the largest possible crowd may have the benefit of them.

When it is remembered that thousands of persons are injured or killed every year by the careless use of small firearms, toy pistols, and the like, on the Fourth of July, the necessity for reasonable restrictions is apparent. This novel experiment, which is to be tried by Chicago will be watched with more than usual interest. It is to be hoped that mayors and aldermen all over the country may take such precautions prior to the Fourth as will lessen the fatalities and accidents.

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Proposed Merging of Civic Organizations

That there are too many civic associations of a national character is only too apparent when glancing over the initials of a few of them. For instance, there are the L. A. M., A. S. M. I., A. P. O. A. A., A. L. C. I., N. M. L., and a lot of others with objects more or less related to the civic problem

The American Park and Outdoor Art Association and the American League for Civic Improvement, have been trying to get together for several years. Joint committees have been at work upon the terms of agreement and now recommend that a proposition for a merger be submitted to the vote of the next convention of these two organizations will be held on the same date. The terms of the proposed merger are officially announced as follows:

"1. That the name of the organization shall be the American Park and Improvement Society.

"2. That its purpose shall be to cultivate higher ideals of civic life and beauty and to promote city and town improvements and to secure the preservation and development of beautiful landscapes.

"3. That it shall have Life Members, Sustaining Members, Members, and Affiliated Members—Life Members to include those who are now Life Members in either of the societies, and any one who shall pay $50 at ane time for this purpose to the new organization; Sustaining Members: and Members to be individuals, the former paying $10 or more and the latter $2 a year; Affiliated Members to be local organizations, to pay $2 a year.

"4. That the officers shall be a President, a Vice-President, Director and two General Vice-Presidents, a Treasurer, a Secretary, and a Vice-President for each section of the work. These officers, together with the President and Secretary of the Woman's Auxiliary, shall compose the Executive Committee. The officers shall be elected by ballot at the annual meeting.

"5. That the President, Director, Secretary, Treasurer and one other member of the Executive Committee, to be chosen by the Committee, shall serve as a Business Committee.

"6. That the work of the Society shall be divided into the following sections, to be presided over by their respective Vice-Presidents:

Arts and Crafts, City Making and Town Improvement, Civic Art, Factory Betterment, Libraries, Parks and Public Reservations, Propaganda, Public Nuisances, Public Recreation, Railroad Improvement, Rural Improvement, School Ground Improvement, Social Settlements.

"7. That the Women's Auxiliary of the American Park and Outdoor Art Association shall become the Women's Auxiliary of the American Park and Improvement So-

ciety, with authority to elect its officers and to conduct lines of work subject to the approval of the Executive Committee."

Trinidad Asphalt Excluded from New York

As we were ready to go to press we received the report that the engineers of New York City had recommended that Trinidad Lake asphalt would be excluded from future specifications. When such eminent engineers as Lewis, Olney and Tillson reach such a conclusion, it is hardly probable that the present administration will dare to permit political considerations to interfere.

This action follows closely the ban of the Engineer Commissioner, of Washington, D. C., against Trinidad Lake asphalt in that city. This act so angered the Asphalt Trust that charges were brought against Prof. A. W. Dow, claiming that his recommendations—which had been transferred to the Engineer Commissioner—were prejudiced and ill founded. The District Commissioners sustained Prof. Dow, but under great pressure—presumably by the Trust—a bill was passed by Congress prohibiting Prof. Dow from giving any further information to cities for a consideration. As the District of Columbia pays only $2,400 a year to its Inspector of Pavements, Prof. Dow will probably resign. It has been stated that all of his predecessors, as soon as they learned the difference between Trinidad Lake asphalt and a good material, entered the employ of the Trust. The question naturally arises: "What can the Trust do with the New York engineers and with their chemists who have held that Trinidad Lake asphalt rots in water, which is the principal cause of the dilapidated condition of the asphalt streets at the present time?"

When Chief Chemist Jackson, of the Water Department, a few years ago, reported that asphalts were unsuitable for reservoir linings, because they oxidized under the influence of water, he did not fully realize the importance of the statement. At that time he reported Trinidad Lake asphalt as the worst rather than the best. Its only merit seems to be its low cost of production.

It is reported that in order to demonstrate the value of their bitulithic cement, after the Trust had attacked them, the Warren Brothers suggested practical physical tests, known prior to that time only to manufacturers, and the result led to the condemnation of Trinidad asphalts. It cannot be stated at this time whether or not it is proposed to make the Warren cements a standard for Greater New York, but this would be impossible, without an amendment, owing to Charter restrictions against the use of patented pavements or articles.

The unfortunate part of the whole matter is that the Trust has the organization and a city may get as poor pavements from good asphalt improperly laid, as from poor asphalt well laid. Municipal construction and municipal education of experts is the solution of the rotten asphalt street problem. Why hire contractors to do this work that it has often been demonstrated can be done more satisfactorily by the city?

Cheap Electric Lighting

OTTAWA, Canada, recently closed a contract with a private company to do its street lighting for $52 per arc lamp per year. For the contract period just closed the city paid the same company $65 for the same service. A drop of $13 per arc lamp is a big saving to the city. It is not at all unlikely that if the city were to go into the business of lighting its own streets, it could do the same work for less money, and, in all probability, secure better service. The not distant city of Hamilton, which is known as "the electric city," pays $84.70 per arc lamp. If it were as fortunate as Ottawa, it would be paying $14,715 less per annum than at present. If Hamilton can rightfully be called the electric city, it should give some ocular evidence of that fact by doing its own lighting.

Water Works Annual Convention

THE twenty-fourth annual convention of the American Water Works Association will be held at St. Louis, the week beginning June 6th. Secretary Divin has pushed the affairs of the Association in every way possible, and it is through his energy that an excellent program has been prepared for this meeting. Besides the reports of the committees, including the subjects of Electrolysis, Standard Specifications for Cast Iron Water Pipe, Uniform Classification of Accounts, Standard for Water Rates, and Insurance, the following papers will be presented:

"The Use of Ozone in Water Purification and a New Method of Producing It," by Mr. Nicholas P. Simin, Moscow, Russia.

"Growths in Water Mains," by Mr. Owen T. Smith, Supt. Water Works, Freeport, Ill.

"Results of a Meter System," by Prof. Edwin W. Bemis, Supt. Water Dept., Cleveland, Ohio.

"Description of Some Foreign Water Works," by Mr. Samuel Morison, Genl. Manager, Jewell Export Filter Co.

"Universal Water Pipe," by Mr. Louis Van Duyn, C. E., Chief Engr. Water Works, Boonton, N. J.

"Some Water Works Notes," by Mr. Jno. C. Trautwine, C. E., Philadelphia, Pa.

"Water Hammer," by Miss Olga Simin, Philadelphia, Pa.

"Fluctuations in Price of Cast-Iron Water Pipe from 1870 to Date," by Mr. John W. Alvord, C. E.

Business Men Clean Streets

MANY cities have ways of achieving municipal cleanliness without a draft on the city treasury. For instance, Corning, a thrifty little city in old Steuben County, (N. Y.) recently, through City Engineer R. H. Canfield, served the following notice on the business men of the town: "To the Owners of Property on Market street : You are requested to clean the pavement in front of your premises before Tuesday noon and the city forces will take up the dirt and keep the pavement clean thereafter." The notice is rather curt, but it was effective, as announced in the daily paper.

Underground Lavatories Abroad

ACCORDING to the Consular Reports, the public works committee of Birmingham, in submitting to the city council a propositon for an expenditure of $7,300 upon the construction of an additional underground lavatory, etc., made an announcement showing that where small charges are made there are profit possibilities in conveniences of this

kind. The committee said that the four underground lavatories, etc., were paying the city a net profit of $2,433 a year. Three of these lavatories paid handsomely and are much appreciated by the public, but the general rate of profit—8½ per cent., if the cost be $7,300 each—was much cut down by the fact that one underground lavatory had been located at a place where there are only occasionally numbers of people assembled. There is no city improvement the utility of which American tourists are so much impressed with when traveling abroad as they are by the underground conveniences mentioned above, and there are few conveniences in life in which American cities are so lacking. In the United States profit could be made by the addition of boot-blacking stands.

The public lavatory is almost unknown in American cities, There are a few in some of the larger cities, but nothing like the number needed to meet the demand. It would pay all the larger cities to go into the business for themselves, even if they had to secure the enactment of a special law for that purpose. It is a business that properly belongs to the city.

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Municipal Contractors Should Be Paid Promptly

THE bad practice of many cities in making contractors wait for their pay for many months after the work has been completed and accepted, is not only a hardship to contractors but is really an additional expense to the city. No contractor can raise an objection to the retention of a reasonable amount of the total cost of any improvement for a reasonable length of time, but he has a just grievance against any municipality which is slow in making its payments for work that has been satisfactorily performed. The cities indulging in this bad practice would find, if they reformed, that they would obtain their improvements at a lower first cost, as the contractors could afford to make lower bids, as they would not have to include in their estimate the cost to them of hiring money to pay their workmen promptly. They have to do business on business principles. If delinquent cities will take notice and mend their ways of doing business they will find it to their profit.

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Mayor Collins Wants Wider Streets

IT is not to be wondered at that Mayor Collins, of Boston, wants wider streets. Some of the streets of "The Hub" are altogether too narrow, while those which have been laid out within recent years are ample in their proportions. Many city streets are too wide, especially in the West. The present tendency is to narrow the street by increasing the width of the grass plot between the sidewalk and the curb, although others prefer the central boulevard effect secured by running a parkway strip down the center of the street. Either method of treatment would be a distinct gain to any street that is fifty feet wide or over, with a few possible exceptions. The park effect on the street is more pleasing to the eye, insures the better growth of trees, and the maintenance of the narrower pavement is less expensive.

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Greater Baltimore Is Now Possible

SINCE the great Baltimore fire the citizens, led by Mayor McLane, have been making strenuous efforts to convince the general public that now was the accepted time to make some improvements in the character and lay out of the streets, besides making some other necessary changes. For a time it appeared as though the people would not back up the proposition, but when the project was submitted to a vote of the people last month it was carried by a large majority. Out of a total of 40,808 votes cast, 22,304 were in favor of the improvement plans, the carrying out of which will make Greater Baltimore possible. It has been fortunate, indeed, that Baltimore had such an energetic Mayor to lead in the fight for better things.

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Antiquated Street Flushing

ACCORDING to a local daily the city of Chester, Pa., has adopted the antiquated method of cleaning its streets by flushing with water from the fire hydrants. This system was employed many years ago on some of the principal avenues of Paris with some success, but was abandoned because it was less effective than a flushing machine made for the purpose. Many of the larger American cities tried, a few years ago, the Paris method, but have discontinued it for the same reason. When a modern street flushing machine which, with the aid of compressed air, can do the same work at a much less expense than with old bungling methods and at the same time more efficiently, can be secured by a city, it is poor economy, to say the least, to adhere to the old system. We shall expect to see Chester drop the worn out old way and adopt the better way of flushing its streets.

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Personalities

—Mr. George W. Oliver will be the next mayor of Charlottesville, Va.

—City Engineer H. F. Lincoln, of St. Albans, Vt., has been re-elected for another year and put in charge of the water system.

—Mayor Jackson, of Houston, Tex., has appointed Clarence George city electrician and re-appointed City Engineer F. L. Dormant.

—Mayor Edward J. Fogarty has been re-elected in South Bend, Ind., by a large plurality; Nelson H. Kyser was re-elected city clerk.

—Democrats of St. Paul, Minn., succeeded in re-electing Mayor Robert A. Smith, Controller Louis Betz, and Treasurer Otto Bremer.

—Mr. Edward J. Bidaman was elected mayor of Terre Haute, Ind., by the largest majority ever given a mayoralty candidate in that city.

—Capt. Carlton McCarthy was nominated for mayor by Democrats of Richmond, Va., and so will be the next chief executive of that city.

—The Board of Wardens and Burgesses of Naugatuck, Conn., elected J. M. Sweeney, borough attorney, and L. S. Beardsley, borough clerk.

—Mr. Robert Hollingsworth has been elected chief engineer of the Water Department of Camden, N. J., by the Council Water Committee.

—The Council of Joplin, Mo., selected the following officers for the coming year: E. C. H. Squire, city clerk; S. S. Nix, street commissioner; Dr. Myers, health officer.

—Mayor Silas Cook, of East St. Louis, Ill., has made the following appointments: E. G. Helm, city engineer; Jesse M. Freels, corporation counsel; E. J. Eggmann, city comptroller.

—Mayor Knight, of Moundsville, W. Va., who was accused of receiving hush money from saloon keepers that they might run slot machines, has been exonerated by the Council after an investigation.

—Mayor Patrick Mullins is to be reimbursed by the Council of Butte, Mont., for the money he expended in preventing the last Council from proceeding further with the suit for impeachment against him.

—In a short message to the Hoboken, N. J., Council, Mayor Adolph Lankering recommended that a committee be appointed to devise ways and means for the establishment of a municipal gas and electric light plant.

—Hon. George P. Wright, lately elected mayor of Tacoma, Wash., has made the following appointments: O. G. Ellis, city attorney; William Welsh, commissioner of public works; Frank L. Davis, city engineer; Dr. L. L. Love, health officer.

—City Engineer Cowden, of Harrisburg, Pa., has expressed himself in favor of placing all wires under ground and believes that, to do this, the city should build and maintain conduits, charging rental for their use by private companies.

—The city of Lawrence, Mass., has lost recently two exmayors, who died within a few days of each other. Hon. Charles S. Storrow was Lawrence's first mayor, being elected in 1853; Hon. Henry P. Doe was elected mayor in 1892.

—Single-handed and with the aid of a revolver, Mayor McCrae of Council Bluffs, Ia., raided the gambling dens of that city recently and arrested the gamblers. The Mayor took this action because all recent raids were "tipped off" before the police reached the spot.

—The new appointments to the cabinet of Mayor O'Hare, of Superior, Wis., have been made by him as follows: Thomas E. Lyons, city attorney; John A. Hobe, city clerk; Howard Thomas, city engineer; Dr. J. A. Rene, health commissioner; Larry Brennan, street commissioner.

—Mr. Andrew W. Crawford, secretary of the City Parks Association of Philadelphia, contributed an article on "Small Parks in Philadelphia" to *The Outlook,* which took first prize in its contest on "The Town Beautiful." Mr. Crawford's article appeared in the issue of May 7.

—Mr. Ben Linskie, chief sanitary inspector of Dallas, Tex., hopes to institute a corps of "white wings" to clean the streets because he feels that the uniforms will enable him to see from a distance whether his men are attending to their duties and because the uniforms will add standing to the cleaning force.

—Mayor Jeffrey of Columbus, O., has caused great satisfaction among the sinking fund trustees of that city because he has asserted that he will provide for the sinking fund as against every fund or department of the city. He said, "I regard it as the heart of the city finances and it must be protected at all hazards."

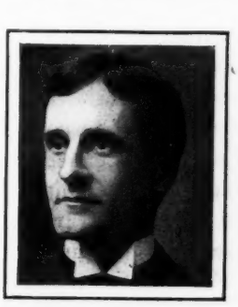
—Hon. Frederick F. Ingram, Commissioner of Public Lighting of Detroit, contributed to the May *Arena* an article on "Municipal Ownership and Operation *vs.* Private Ownership or Control," in which the author argued in favor of municipal ownership of public utilities, and strongly condemned public ownership and leasing to private companies.

—Mayor William Glasmann of Ogden, Utah, has got into trouble in connection with his office. A citizen has filed a complaint against him, seeking his removal from office on the charge that he has permitted gambling and places of ill-fame to exist in violation of the law. He also is charged with being interested and permitting other officials to be interested in contracts with the city contrary to law.

—Commissioner Neville, of the Department of Public Works, Rochester, N. Y., wishes to make his city the cleanest in the State, and believes it could be done if the district foremen did their duty and saw that all the men worked well. One great trouble was the tendency of the men to talk, so he suggested that the gangs be separated, so that each man could work alone. The Commissioner is to hold frequent conferences with the foremen.

—Elections for Mayor in Indiana cities resulted as follows: Elkhart, Hon. Charles F. Greene, re-elected; Goshen, Mr. Alfred Lowrey; Laporte, Hon. Lemuel Darrow, re-elected for third time; Michigan City, Mr. J. E. Schultz; Ligonier, Hon. Fred Green, re-elected; Valparaiso, Mr. William F. Spooner; Hammond, Mr. Lawrence Becker; Greencastle, Mr. James McD. Hayes; Crawfordsville, Mr. Edward Voris; Washington, Mr. Hale Clark; Peru, Mr. William Odum; Shelbyville, Mr. John W. Vannoy; Auburn, Mr. J. Y. McClellan; Warsaw, Mr. Andrew G. Wood.

Mayor McLane Gets Married



MAYOR Robert W. McLane, of Baltimore, recently surprised his friends by slipping over to Washington with the widow of Dr. John Van Bibber and marrying her. The bride is a very beautiful woman and was a leader in the social circles of Baltimore. The Mayor gave no intimation of his coming marriage beyond the fact that he telephoned President of the Council Timanus to assume the office of acting mayor for a few days as he was going out of town. After the ceremony the Mayor telegraphed the news to a friend.

Mayor McLane belongs to a prominent family, his uncle, Robert McLane, having been Minister to France and Governor of the State. Mayor McLane is the youngest mayor Baltimore has ever had. He was elected in May, 1903, for a term of four years and has shown himself to be well fitted to discharge the duties of his office. The recent conflagration in Baltimore brought out the man's character and his handling of the important work of reconstruction of the burned district has proved his ability.

As a result of her marriage to Mayor McLane, Mrs.

McLane will lose most of her interest in the estate of her former husband. His will provided that two-thirds of his estate should go elsewhere if his wife married again.

The Labor Mayor of San Francisco

Eugene E. Schmitz

Hon. Eugene E. Schmitz, Mayor of the City and County of San Francisco, has an unusually picturesque and interesting personality. Formerly an orchestra leader, he has been elected to office for the second term as a representative of union labor with Republican affiliations. Mayor Schmitz's career has but just begun. More than six feet tall, athletic in build, genial and magnetic in temperament, the Mayor makes a fine impression. In some quarters he is looked on as the logical probability for the next Governor of California.

During his first term Mayor Schmitz naturally made slow headway with his reform policy against the well intrenched forces of the opposition, but with his second inauguration he gathered much more strength and now has control of nearly every Board and Commission, the chief exception being the Board of Supervisors.

Repeatedly during his first term the Mayor stated his intention of remodeling the public service on lines of greater efficiency and smaller expense. Early this year he began in earnest the carrying out of his policy, giving especial attention to the Board of Health.

"We have tried to select men with sole reference to efficiency," said the Mayor, speaking of his policy. "The rules of the Civil Service Commission hamper us, especially that one which insists that men must be laid off in the inverse order of their appointment. In retaining the most efficient men we have violated that rule, and the Merchants' Association has brought suit, tying up the salaries of a number of new employees; so I can do little in the way of carrying out my policy until the suits shall be settled.

"However, a great deal has been accomplished. In the Department of Public Health, duties of employees have been altered and positions consolidated at a saving of $9,000 a year, and the department is on a basis of greater efficiency than ever before. Besides this, under the able leadership of Dr. J. W. Ward, president of the Board of Health, various important and far-reaching reforms have been inaugurated, while others are under consideration. Systematic medical inspection of school children has been taken up by a corps of fifty volunteer physicians, which number will be augmented. The raising of the milk standard has been urged, and the Supervisors will probably amend the ordinance to make the required percentage of butterfat 3.5 instead of 3.2 as at present. This will do much to decrease the rate of infant mortality. Sanitary inspection in general, and especially with reference to school buildings and dairies, is more thorough than ever before. We hope for good results from the issuance of a pamphlet containing health and sanitary hints for the general public.

"Great reform has been made in the selection of teachers for merit solely, after competitive examinations. In the Police Department eight-hour watches have been inaugurated, and there is a noticeable increase in efficiency. I hope to see the firemen get still further time off, at least one day a week. They deserve this as they are constantly on duty.

"Some improvement has been made in the management of the Department of Public Works, and it is intended to reorganize that department, securing greater mobility and efficiency. On the Park Commission I have appointed William J. Dingee, a man of great wealth, who has announced his intention of giving liberally toward certain objects in which he takes especial interest. I hope to see arrangements, also, for more concerts in the parks.

"It has been the constant aim of this administration, while bettering the condition of the individual employee, to see that a genuine merit system shall prevail, and to encourage public servants to do their full duty as conscientiously as they would have to do it for a private corporation. That is why better results are now secured with less money than ever before in the history of the city."

Convention Dates

June

The American Water-works Association will hold its annual convention at St. Louis, Mo., June 6-9. J. M. Diven, secretary, Elmira, N. Y.

August

The League of Georgia Municipalities will convene at Savannah, Ga., August 10, 1904. Mayor Bailey, secretary, Griffin, Ga.

The National Firemen's Association will hold its annual convention at St. Louis, Mo., August 22-27. D. W. Gillen, secretary, 176 Monroe street, Chicago, Ill.

September

The annual convention of the International Association of Fire Engineers will be held at Chattanooga, Tenn., September 14-17. Henry A. Hills, secretary, Wyoming, O.

October

League of American Municipalities will meet in seventh annual convention at St. Louis, Mo., October 4-6. Hon. John MacVicar, secretary, Des Moines, Ia.

Sewers, Pavements and Street Lights in Cleveland

The need of a general sewer system for the low sections of Cleveland, O., was shown in the report of City Engineer Carter for 1903. In case such a system were established it would be necessary to put in a pumping station to raise the sewage to the high level sewers. Mr. Carter also urged immediate completion of the intercepting sewer. During the year 23.4 miles of sewers were built, 15.6 miles of paving were laid, and over 1,000 new street lights established. At the close of the year there were 223.3 miles of paved streets, of which 17.4 were asphalt, 87.2 Medina stone, 117.7 brick, 0.3 wood, and 0.7 macadam. The city has 10,289 street lights, including 6,500 gas lamps, 2,670 vapor, and 1,119 incandescents. The gas lamps are owned and operated by the city, each of which now costs $12.78 per year, as against $16.10 when the company operated them.

New Gas Ordinance in St. Paul

THE city of St. Paul and the St. Paul Gas Company have been involved in a prolonged dispute over a renewal of the old ordinance of the company, but the matter has been happily settled, in part, through the efforts of Corporation Attorney Michael, favorable to the city. The life of the new ordinance is to be twenty-five years from January, 1907, and all previous rights of the company are to cease at that time. The Commissioner of Public Works is to have control of the laying of all pipes, subways, etc., and the company must, at its own expense, change its pipes whenever the Council decides it is necessary. A book of profiles showing pipes, conduits, etc., must be filed with the Commissioner of Public Works by the company and be kept up to date. When deemed necessary, the company must file a bond of $50,000 for the faithful carrying out of this ordinance. In addition to the general taxes assessed against the company, the said company must pay an annual license fee of 5 per cent. of the gross earnings derived from the privileges of the franchise, except from the sale of gas stoves, fixtures and appliances.

Gas must be furnished to the citizens at the net price of $1.15 per 1,000 cubic feet for the year 1904, at $1.10 for 1905, at $1.05 for 1906, and at $1 per 1,000 cubic feet during the remaining years of the franchise. But a charge of 20 cents per 1,000 cubic feet may be added to bills not paid before the fifteenth of the month following consumption of gas, and a minimum price of 25 cents per month may be charged. During the life of the franchise the rate for gas to the city is to be $1 per 1,000 cubic feet, the same not to be metered. The gas must, in all cases, be of good quality; free from noxious impurities, and all coal gas must be at least sixteen candle-power, and all water gas twenty-two candle-power, within a radius of one and one-half miles of the holder. If the company ever disputes the fairness of these rates and carries the case to court, the rates fixed by the court are to be binding, but said court shall not fix the maximum price for gas furnished higher than $1 per 1,000 cubic feet. No deposit for installing service in advance of what is reasonable to secure payment of current bills is to be required by the company and the same is to be refunded on removal of the meter and, in addition, an annual interest of 5 per cent. must be paid on the deposit, payable annually or at the expiration of service. Unpaid bills are not to be a charge against property, nor shall any one be denied service because of bills unpaid by previous occupants.

The company must not consolidate with any other competing company, nor pool its stock business, nor make division of territory, nor acquire, use, own, or control any property of any other such company without the consent of the Council. None of the rights granted by this ordinance shall be disposed of or leased without a two-thirds vote of the Council. Any other franchise or privilege held by said company is to be subject to an annual license fee of 5 per cent.

All the companies controlled by the Gas Company were to file an acceptance of this ordinance, including a license fee of 5 per cent. per year. The Edison Electric Light and Power Company of St. Paul claimed to have a perpetual franchise and this point was one of the main points of contention. It was provided by this ordinance that the franchise of said Edison Company should terminate in 1932.

Tree Planting Commissions

THE appointment of a tree-planting commission in the city of Newark, N. J., by Mayor Doremus, a short time ago adds another city to the list of those which are recognizing the great part shade trees play in the healthfulness of the city. The movement was started by the Board of Trade. Under the law the commission is empowered to plant trees in the streets wherever it may decide. The first cost is to be borne by the property owners, but the city must then provide the cost of maintaining the trees out of annual appropriations.

Atlantic City is another Jersey city that has taken up the question of tree planting in earnest, and an ordinance has been passed to help along the work. The salt air and arid soil make conditions there difficult for the growing of trees or shrubbery except good earth be imported from the mainland.

Buffalo trees have been suffering from neglect and other causes, such as leaking gas, that threaten to destroy all the beautiful shade trees that grace the streets of that city. The horses have done an immense amount of damage. An effort was made to save the trees by securing the appointment of a forestry commission for the city. The work of an organized department is necessary to care for the trees of any city and the success met with in many cities from the work of such forestry departments should encourage every city to establish one.

The Park Commission of Chattanooga, Tenn., was recently aroused because of the number of trees destroyed or injured by electric light, telephone, and telegraph companies, whose employees play havoc among the trees when stringing their wires. An ordinance of the city places the trees under the authority of the commission and provides a penalty for pruning, trimming or cutting any tree without the authority of the commission. The repeated shocks sustained by the trees from electric currents coming from wires with worn insulation, is a potent cause of their death. It is the purpose of the commission to make an example of such persons as violate the ordinance.

Indianapolis Trees Threatened with Destruction

THE menace to trees from trimming to permit electric wires to pass through them has threatened the trees of Indianapolis, Ind., according to the report of the Park Department. Superintendent J. C. Power stated that the best time to trim trees was when they were in leaf and when new growth begins. From September until freezing time is a good season. All trees are subjected to the attacks of insects, but the birds do a great deal towards keeping down the number of these pests. He suggested that the birds receive better protection. San Jose scale was found in some parts of the city, and this necessitated the removal of some 500 fruit trees. For the past five years about 4,000 trees have been planted each year in the city parks. The cost of maintaining these parks in 1903 amounted to $96,271.17, as against $85,648.29 in 1902. At the end of the year the Department had an unexpended balance of $100,986.81, the main portion of which was appropriated for two boulevards.

Plumbing Regulations in South Bend

The necessity for proper plumbing regulations and a regularly appointed plumbing inspector in South Bend, Ind., has resulted in the passage of a long ordinance covering the details of plumbing work and the duties of the inspector. The salient points in the ordinance are as follows:

House drains must have six-inch running traps, placed as near the curb as possible, with four-inch fresh air inlets, brought six inches above the surface of the ground, with a ventilating cap. The upper four feet of inlet must be of four-inch cast-iron soil pipe, which, from three feet outside of the basement to a point above the highest fixture, must be of extra heavy pipe. All soil pipes must be of a diameter not less than four inches and must extend not less than two feet above the roof and have a diameter above the roof one inch greater than the rest of pipe. Rain water leaders are not to be used as soil or vent pipes, or *vice versa,* and when within the house must be of standard cast-iron soil pipe and connected to the drain below the lowest fixture. Where a leader opens near a window or light shaft, it must be trapped at its base. No cap shall be affixed to soil or vent pipes, which must be of a thickness of not less than three-eighths of an inch in diameter of five or six inches, with proportional increased thickness for greater diameters. Quarter bends, tees, or offsets shall not be used, and pipe rests must be placed every fifteen feet on vertical and ten feet on horizontal lines. Cast-iron pipe for plumbing must have average weights of five and one-half pounds per foot for two-inch, twenty pounds for six-inch, and fifty-four twelve-inch diameter, with proportional weights for other sizes. Waste pipes of two inches or less must be of lead, or cast-iron. For wash basins the diameters must be one and one-fourth inches; for tubs, baths and sinks, one and one-half inches; for slop sinks, two inches; for closets, four inches; and each fixture must have a separate water seal trap near it. Drum traps are to be used for foot, seat, or bath tubs and must be at least four by eight inches in size. Special air or vent pipes of the size of the waste pipes up to two inches must be placed to prevent siphonage. From two to four inches, two-inch vents must be used. The lower ends of all vertical stacks or branch lines must have a clean-out plug with brass screw caps, of a size equal to that of the pipe, and this plug must be placed in an accessible position.

Drains must have a uniform fall of one-fourth inch to the foot and cast-iron pipes must be coated with tar, varnish, or suitable material inside and out; the joints must be packed with oakum and run with lead. Connections of lead and iron pipes must be made with brass ferrules or with brass solder nipples of the size of the lead pipe and screwed to the iron.

Vents may run separately to the roof but must extend at least two feet above. If it be on a one-story building and less than fifteen feet from a window or opening in a building, it must be carried five feet above the highest window or opening. No vents must enter a chimney flue. Drains and waste pipes must be exposed to view for inspection and repairs and, when within walls, must be covered with woodwork screwed down. Steam exhausts, wastes from refrigerators, etc., must empty into open tanks which are to be trapped and connected with the sewers. No putty may be used to connect a closet and floor opening, but instead brass flanges soldered to a lead bend with rubber gasket. No closet may be placed in any unventilated apartment or bedroom.

At least six-inch glazed sewer pipe must be used to connect houses with sewer, have a grade of one-fourth inch to the foot, and have a trap to include all branches.

All plumbers must register with the plumbing inspector and must file a statement whenever any plumbing work is to be laid, paying a fee of $1 for permit for buildings of seven rooms or less, and $2 for larger houses. Special permits must be secured when it is not possible to construct plumbing in accordance with the ordinance. The inspector must be notified and inspect the soil pipe when completed and again when connected with sewer, and all plumbing when completed. Water, air and peppermint tests must be made. Appeals from the inspector may be made to the health commissioner. Fines of from $5 to $50, with imprisonment until paid, are the penalties for violation of this ordinance.

Oiling Roads in India and California

The Executive Engineer of Bombay, India, has reported to the Municipal Commissioner the results of his experiments with mineral oil as a means of improving the surface of roads. He stated that there could not be two opinions as to the desirability of treating the roads with oil, because of the success of the oil in laying the dust. In his opinion the best time in which to apply the oil is immediately after the road is newly coated and rolled, before any sandstone, or other binding material is applied, so that the interstices will be followed with the first coat of oil and thus waterproof the surface. The road should be treated with a second coat of oil after the binding material has been put on. The cost would be larger by this method, but the result would be more lasting and there would be increased economy in maintenance. Only heavy oils should be used. Comparing the cost of oiling with crude kerosene oil with that of watering on 5,800 square yards of a Bombay road for 202 days, it was found that the oiling, with sweeping every two weeks, amounted to $167.33, while the watering, including the cost of water at 3 cents per 1,000 gallons, repairs to hydrants, scraping every second day, and general maintenance, came to $109.17, or about 1 cent per yard more for oiling than watering.

Twelve or fourteen years of experience in the work of oiling roads in Santa Clara County, Cal., has proved the success of this method of allaying dust. Henceforth, according to Clark Alberti of the State Bureau of Public Highways, oil will be used on all roads where water cannot be obtained at a nominal cost. The chief objection to the oil when experiments were first made, was the fact that the oil made the road disagreeable to travel and tended to soil vehicles and clothing, but after a few days, when the oil was worked into the surface and the latter became smooth by rolling, no trouble remained. The first application of oil did not cause as much inconvenience as the first application of gravel, when it took nearly a year for the latter to pack well.

In their report to the Department, the Supervisors of Santa Clara County stated that the use of oil has been a decided advantage when expense is regarded. The cost per mile of watering the valley roads averaged $87 a season, exclusive of the cost of the water, water-works, wagons, repairs, etc. With all these expenses added, the cost would reach $123. The cost of oiling a mile of road for the first season was $90, for the second $50, and with a decreasing amount each succeeding year. Sand, clay, loam, adobe, gravel, and all kinds of mixtures are met with in these roads. Before oiling, the roadbed is graded to a suitable crown. Loam or sand is then spread and the whole rolled well. The loam covering has not been as good as sand or screened gravel. At times the covering is not done and then the rolling is omitted. From 100 to 400 barrels of oil per mile has been used for the first application, according to the width oiled. The work is done by means of improved oiling wagons, the oil being heated by steam to a temperature of 300 degrees, when an expansion of about 3 per cent. takes place. The quantity used per mile is estimated after heating. The oil used, Bakersfield, has a specific gravity of from 14 to 17 degrees and after application has cost about 90 cents a barrel and upwards, according to haulage. Speaking from experience regarding the use of oil on roads in California, Nathaniel Ellery, State Commissioner of Highways, stated that the oiled roads in the southern part of his State were made a success because a study has been made of them by the road builders there. To build a good road of this character a good foundation must be laid. Plenty of gravel and sand should be incorporated in the oil when it is applied; the failure to do this has been the cause of the non-success of many oiled roads.

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New Refuse Destructor for New York

A NEW station for the destruction of the rubbish and paper collected by the Street Cleaning Department of New York, has been lately put into operation by Commissioner Woodbury. In reporting to Mayor McClellan on the plant, the Commissioner said in part, "The paper wastes, boots, shoes, tin cans and metals are separated and the residue that is unsalable destroyed by incineration. Each yard of material that goes into the furnace produces seven horse power. We have a capacity for producing 200 horse power per hour. Each one of these horse powers will produce one and one-fourth arc lights of 2,000 candle power. One arc light is equal to twelve incandescent lights. This means 250 arc lights or 3,000 incandescent lights. The city pays $146 per year for each arc light; 250 arc lights at $146 equals $36,500.

"When we towed this rubbish to sea and threw it overboard it cost thirty cents per cubic yard. We are disposing of 136,000 cubic yards a year at this plant, allowing that one-half of this is trimmed, the city of New York is saving $21,000.

"The city receives $200 a week and $50 worth of labor for the contractor who operates the plant. This amounts to $10,400 in cash per annum and the operating of the plant for the privilege of trimming. Thus a total annual income of $67,900 over the previous system of dumping at sea is secured by disposing of the refuse in this way. Allowing $1,000 for maintenance of plant, which cost $28,900, gives a total earning of $66,900.

"During the winter months when scows and tugboats could not be hired at any price, and the ice prevented the shifting of scows that were already in use; this plant continued as usual every day, earning money for the city. We are now utilizing the steam power with a twelve horse-power engine that runs the conveying belt for the sorters and a thirty-five horse-power engine for electric lighting. We have already equipped the plant, the inspector's office, the adjacent dumping board and Stable 'B' of the Department with lights.

"By working this plant continuously the $67,900 would be doubled, making $135,800, less $2,000 for maintenance of plant, or $133,800 per year."

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Meter System Proves Its Worth

DURING the past year two important things have been accomplished in Ft. Worth, Tex.: The completion of the Meade system of artesian water supply, and the introduction of the meter system. In four years the annual revenues of the Water Department increased over $19,000, although the rates were cut from 20 cents to 10 cents per 1,000 gallons when the meter system was introduced. Inside of five years Mayor Powell thinks that the revenues will have paid for the new system. In 1901 about 1,000,000 gallons a day more were pumped than for a similar period in 1904, although there are 1,600 more services at present than in 1901. This saving in pumpage, together with the 50 per cent. reduction in rates, have amply justified the introduction of the new supply and the meter system.

The city charter should be enlarged in scope that the city might have power to regulate the rates and service of the public utilities of the city in the hands of private concerns. No public franchise should be sold or given away by the Council without a vote of the people; the ultimate veto power should rest in the people. The charter should give citizens direct legislation in legislative matters. Several Texas cities have adopted the referendum and Ft. Worth should follow their example.

Good management has brought the finances of Ft. Worth out of a state of chaos and placed them on a fair basis. When Mayor Powell took hold it was a question whether the debt of the city should be paid or improvements made. It was decided to make the improvements which were sorely needed. The result has been a rapid rise in valuation which will greatly aid in paying off the debt. The policy of the Mayor was to "pay as you go" and he does not believe that any city should issue bonds if it can be avoided. Some $500,000 worth of permanent improvements have been made without the issue of a bond, while the city is in better financial state than when he took office. He characterized bond issues as "curses that hang like millstones around the neck of progress of any municipality." They may be justified in the early history of cities, but not when any size has been attained.

NEWS AND PRACTICE AMONG THE CITIES

City Judged by Condition of Streets—Water and Light Rates Reduced—Well Water Inspection in Minneapolis

Thorough Deliberation Before Decision

In his message to the Council of Quincy, Ill., Mayor Steinbach stated that he trusted no member of the Council would commit himself to any course until he had thoroughly discussed the matter with his colleagues. He felt that no serious mistake would then be made, because experience has shown that they arise from premature decisions before discussion. The Council was soon to determine upon the granting of franchises for a gas plant and telephone service and the greatest care should be used in determining the provisions entering into them. They will affect the city for a long period and so the city's future as well as present interests should be safe-guarded. While the Mayor believes such utilities should be in the hands of the city, Quincy is not in a position to undertake them. Nor is the city able to do much in the way of paving and sewer work this year.

City Judged by Condition of Streets

"The streets of a town, good or bad, give visitors a lasting impression of a town," said Mayor Riordan in his message to the Council of Harrison, N. J. Therefore the streets should be kept in good condition and in doing future paving the strictest supervision should be employed. He suggested that copies of the specifications, under which any paving is being done, should be distributed to the property owners along the streets to be paved and that every property holder be requested to see that the work is being done properly, reporting neglect. A great improvement could be made in the streets if the telephone and electric companies were required to replace their ugly poles with fixtures having neatness and beauty.

He recommended that a contract for water be made with Jersey City instead of taking water from a private company, as Jersey City will supply the water at $60 a million gallons, or about two-thirds the price of the company. Railroad property should be taxed the same other and tax rate, consequently, would be reduced from $2.54 as at present, to $1.80 per $100. In expending public money, economy should be used and full value should be required for the people's money.

Tacoma's Mayor Believes in Municipal Ownership

Politics should have no place in the conduct of the city business in Tacoma, Wash., according to Mayor George P. Wright. He lays claim to no support because of party allegiance. Regarding the matter of the light and water property of the city, he is a firm believer in the public ownership of such utilities to the extent of the financial ability of the city to acquire and maintain such enterprises. "It requires no argument to sustain the contention that the city should manage such enterprises on behalf of the citizens rather than to turn the same over to a corporation whose charges for use will be such as to make large profits in addition to construction and maintenance cost." Competitive corporations should be admitted to the city, but conditions should be exacted on behalf of the citizens to compensate in some measure for the valuable privileges granted. Regarding the police control of vice, the Mayor believes that the offenders should be segregated that the police force may exercise the control over them that is not possible when they are scattered. Finally, Mayor Wright recommended that the city's books should be overhauled at least every two years by expert accountants.

Improvement Work to Be Pushed

The improvement of several streets should be carried out this coming year according to Mayor O'Hare, of Superior, Wis. The ordinance, lately adopted, providing for the building of cement walks should be strictly enforced. Inasmuch as the Street Commissioner has charge of street repairs, Mayor O'Hare urged that the Commissioner should have the appointing of the foreman on the streets, instead of these men being appointed by Council for a certain term, whether their work be satisfactory or not. The Commissioner could then exercise direct control over the men and remove them for cause with the consent of the Board of Works.

City's Progress Depends On Improvements

It is the purpose of the Board of Public Works of Indianapolis, Ind., to extend the area of permanently improved streets as far as is consistent with the necessities of the public. The Board has found that the public opinion is with it in its belief that the progress of the city is immeasurably coincident with public improvement. The method of cleaning the improved streets of the city in 1903 was expensive, $80,640 having been expended for this purpose. A new contract has been made for this work whereby the Board hopes to clean all improved streets thoroughly and to flush the streets in the business section for the sum of $72,500 for the year.

May Not Open Pavements to Lay Pipe

Instructions have been issued by the Board of Public Service of Toledo, O., to the gas companies of the city and to the Superintendent of Water Works that hereafter all connection with water or gas pipes must be made before pavements are laid. If the connections are not made after the companies have been notified that a contract has been let for the improvement of any street, a period of three years must elapse before the street so improved can be opened for the purpose of making a connection. So many pavements have been seriously damaged by continually ripping them up for pipe connections that this action was considered necessary to preserve them.

Salaries Paid in Houston

THE salaries for Houston, Tex., officials not specified by the charter or ordinance have been fixed by the Council of that city as follows: Secretary $2,100, last year $2,100; chief of police $2,000, last year $2,000; city engineer $3,000, last year $2,000; recorder $1,500, last year $1,500; assessor and collector $3,600, last year $3,600; treasurer $2,000, last year $1,800; fire chief $1,800, last year $1,800; city attorney $4,000, last year $2,500; street commissioner $2,000, last year $1,800; health officer $2,500, last year $1,800.

Reasons for Desiring Brick Paving

IN endeavoring to decide upon the proper pavement with which to pave Broadway, Augusta, Ga., a petition signed by about 200 property owners on that street was drawn up and sent to the Mayor and Council. The reasons for desiring brick were given in the petitions as follows: It could be supplied by home enterprise; it is the most durable and economical material offered; it can be repaired by city workmen; no expensive plant must be maintained for repairs; use of brick allows raising or lowering of street grades, it is practically impervious to moistures, is dry and easily cleaned.

Well-water Inspection in Minneapolis

THE Council of Minneapolis, Minn., has directed the Commissioner of Health to make a careful examination of any well-water in the city that he may have cause to believe is contaminated or unwholesome for drinking purposes. The Commissioner or his deputies are empowered to enter any house or premises to obtain samples for such analysis. Should any well prove contaminated, a metal tag is to be attached to the water-drawing device and is to state that the water must not be used for drinking. A fine of $25, or thirty days' imprisonment, is to be imposed on anyone removing said tag.

A Great Capital City

INDIANAPOLIS—like Jerusalem, " a city at unity with itself," where the tribes assemble, and where the seat of judgment is established—is in every sense the capital of all the Hoosiers. With the exception of Boston and Providence, it is the largest State capitol in the country; and no other American city without water communication is as large. It is distinguished primarily by the essentially American character of its people. The total foreign-born population of Indianapolis at the last census was only 17,000; whereas Hartford, which is only half the size of Indianapolis, returned 23,000; Rochester, with seven thousand fewer people, returned 40,000; and Worcester, in a total of 118,000, reported 37,000 as foreign-born. A considerable body of Germans and German-Americans have contributed much to the making of the city; but the town has been passed over by the Swedes, Poles, and Bohemians that are to be reckoned within many American cities. There are, however, five thousand negro voters in the city. Indianapolis is marked again by the stability of its population. A large percentage of the householders own their homes; and a substantial body of labor is thus assured to the community. —MEREDITH NICHOLSON, *in the June Atlantic.*

Contract for Lighting Let in New Orleans

COMMENCING September 30, 1905, New Orleans, La., is to have fairly cheap street lighting for ten years. A franchise for that period was granted the New Orleans Railways Company at its second bid, the first having been under bid by a competing company. The rates for service will be $85 for underground service, $69 for overhead service, and 6 cents per kilowatt-hour for energy. It will be recalled as stated in the December, 1903, issue of THE MUNICIPAL JOURNAL, that the installation of a municipal lighting plant was strongly urged by citizens and both City Engineer Hardee and City Electrician Olroyd reported on the cost of a municipal plant, bids even being made by electrical concerns for the construction of the plant. As compared with the prices charged by the holder of the present contract, the New Orleans Railways Company, the municipal plant idea would have been a saving proposition, but the new bid of this company is considerably below its old rates and the estimated cost of municipal service.

Low Cost of Arc Lights by Municipal Plant

A FULL statement of the work of lighting Jamestown, N. Y., by the municipal electric light plant was given by Superintendent C. G. Lundquist in his report for 1903-4. He figured it out that the cost of arc lamps to the city was $35.28 per year each, but by deducting the expense of lighting for the city hall and fire houses, estimated at 4 cents per kilowatt-hour, the net cost of each arc was brought down to $28.34 per year. The operating expenses, including insurance and interest on bonds aggregated $25,297.26. The number of arcs supplied was 347, twelve of which with 1,266 incandescents, were in public buildings, an all night, every night schedule being in force. During the year, 457,856 kilowatt hours were used in street lighting and 746,632 in commercial lighting; an average of 5.5 pounds of coal was used for each kilowatt-hour. The salary list amounts to $5,340 a year, the day's work consists of eight hours, and no overtime is allowed.

Good Road Work in Massachusetts

DURING 1903 there were built in Massachusetts, under the direction of the State Highway Commission, sixty-seven miles of road, making the total number completed at the time of the report, 482. Plans for 74.17 miles of road were made, bringing the total mileage of roads planned to 505.07. The Commission made twenty-seven contracts with town or city authorities. The Commission has also petitions for 1,663.26 miles distributed among 282 towns and twenty-five cities. During the year the Commission had at its disposal $550,000, of which $450,000 was from the two and a quarter million appropriation made for a term of five years. The counties bore one-fourth of the total cost, or $143,351.38. Over $55,000 were spent for repairs and over $18,000 will be returned to the State from towns where repairs were made. The method of road building has not changed, the telford foundation having been discarded some time ago and nothing has developed since to warrant a return to its use.

Water and Light Rates Reduced

IN order to head off the installation of a municipal water plant in Chattanooga, Tenn., the water company offered to reduce the rates about 20 per cent. on all but manufacturers. Thus the rate is lowered for consumers using less than 50,000 gallons per month from 35 to 25 cents per 1,000 gallons. Similar reductions are made for all amounts up to 300,000 gallons per month. The meter rate is also lowered from 90 to 75 cents.

The Board of Aldermen of Newport, Ky., has fixed the water rates as follows: In cases where the annual consumption of water amounts to 100,000 gallons, the rate will be fifteen cents per 1,000 gallons; firms using from 300,000 to 600,000 gallons annually will be charged twelve cents per 1,000 gallons, and from 600,000 to 1,000,000, ten cents per 1,000 gallons.

The Council Lighting Committee of Charleston, S. C., has arranged with the private lighting company for a reduction of rates for arc lighting. Hereafter the price per arcs will be $80 for the first year and $75 thereafter, while the latter price will apply to the present arcs. The city is to have the right to increase the number of lights at will. Under the old contract the city paid $97.50 for arcs, $90 for the Kitson light which is to be abandoned, and $23.50 for gas lights. The gas lights are now to cost but $21.50 per year.

A recent decision of the Illinois courts held that the People's Gas Company of Chicago could not prevent a reduction by Council in the rate for gas from $1 to 75 cents per 1,000 feet. An injunction at present has prevented action by the Council.

After July 1 the Board of Water Commissioners of Duluth, Minn., have decided that the water rates shall be as follows: First 8,000 cubic feet at 17½ cents per 100 feet; next 8,000 cubic feet at 10 cents per 100; next 60,000 cubic feet at 7½ per 100; all over 60,000 cubic feet at 5 cents per 100. The old rates ran from 25 cents for 2,700 cubic feet to 120,000 cubic feet at 5 cents per 100. The flat rate on baths, closets, and basements will also be reduced from $3 to $2. The old rule for boarding houses was an addition of 10 per cent. of the regular family rate for each roomer above a certain number. This will now be changed to $1 per room regardless of the number of boarders. Since the city bought the works the rates will have been reduced about 45 per cent. when the new schedule goes into effect.

Detroit to Regulate Running of Street Cars

THE Council of Detroit, Mich., has recently passed an ordinance to regulate the running and operation of street cars. The running time for cars on one section between 6:30 A. M. to 6:30 P. M. is restricted to a certain space of time for the round trips which allows for a speed that is consistent with safety. On the main sections, except on Sundays and holidays, a headway of four minutes must be maintained between these hours, but from 6:30 A. M. to 8 A. M. and from 5:15 P. M. to 6:20 P. M. a two-minute headway must be maintained. On other less important sections of the road the headway of cars is to be five, six, seven and eight minutes, the headway, in all instances, being determined by the amount of traffic using the several lines. On Saturdays in the late afternoon hours, a better headway must be maintained. All regular passenger cars must be run through to the ends of the respective routes, except in case of accidents or delays, when a car may be returned along the route, provided the passengers therein are transferred to a following car going to the same destination as the former, and which is within a block of said former car. A penalty of $50 and imprisonment for three months is fixed for violations.

The committee that drew up this ordinance, found that the schedules, heretofore made by the railway companies, were so arranged that it was impossible to comply with them without running by prospective passengers in the endeavor to keep the schedule with the smallest number of cars. There have been no restrictions upon the railway service with the consequence that the company has decreased the service at will. It is the purpose of this ordinance to so regulate it that a sufficient number of cars will be run for the convenience of the people at such times as they are needed.

Cost of Macadamizing Streets in Rockford

THE cost of macadamizing streets during 1903 in Rockford, Ill., averaged 32.6 cents per square yard, or about $1.31 per linear foot, including grading, curbing and macadamizing. The streets varied in width from thirty-four to forty feet and the distance of hauling stone from the municipal quarry varied from one-half to four miles. A new boiler was installed at the quarry where, according to City Engineer Edwin Main, 13,693 cubic yards of stone were crushed at a cost of 43 cents per cubic yard. Instead of ruthlessly tearing up a macadam pavement for the purpose of laying a sewer system, the City Engineer deemed it advisable to lay the twenty-seven-inch sewer pipe between the curb and the walk. Mr. Main a year ago recommended the purchase of an asphalt repair plant and Superintendent of Streets A. G. Larson this year endorsed this proposition, for the asphalt streets should be repaired often to keep them in good shape. A steam road roller was also recommended for repair work, as the rollers now used are usually busy on macadam work.

Cement Walk and Curb Specifications

SPECIFICATIONS for sidewalk and curb in Braidentown, Fla., have been adopted by the Council and will prove interesting especially to sea coast towns where oyster shells are plentiful. An excavation of five inches is to be made and the subgrade well tamped. Then four inches of concrete is to be placed on this foundation, the composition of the concrete being as follows: One part of best Portland cement equal to the "Atlas" brand, two parts of clean sharp sand, and six parts of oyster shells. The concrete must be laid in box form and tamped until moisture comes to the top. One-inch top dressing of one part Portland cement and two parts of sand must be placed upon the concrete before it sets and be troweled true until a cement finish is obtained. The concrete must be placed in alternate sections and be allowed to set before the intervening sections are filled in. The curbing is to be six by eighteen inches in not exceeding six-foot lengths and is to be composed of two parts of sand and one part cement of the same character as the top dressing of walk.

STORAGE OF PETROLEUM AND CHEMICALS

Practice in England Applicable Elsewhere—Causes of Explosions—Precautions to Be Taken with Explosives and Petroleum

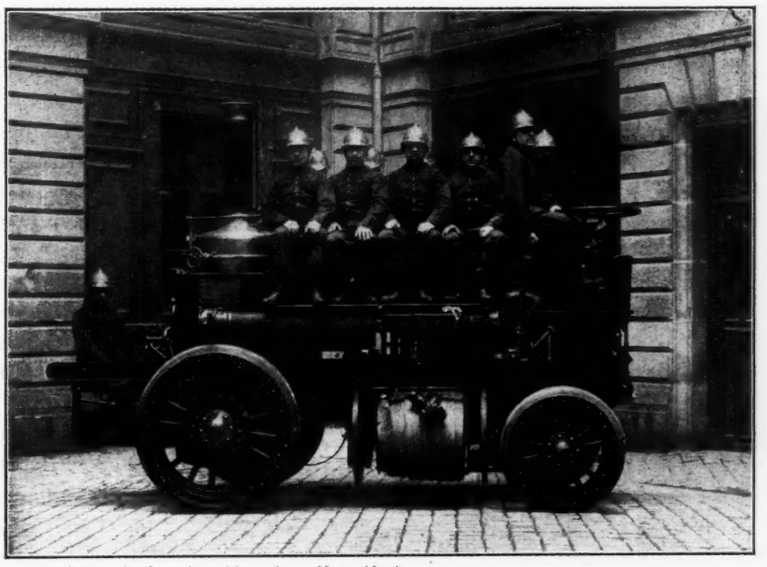
By Captain Thomson *

(Concluded from May Issue.)

Storage of Petroleum

As to the place where the petroleum should be stored, it is very desirable that this should be outside the fire-risk of a dwelling house, that is to say, in some building wholly detached or separated by a fireproof wall. Probably the safest method is in an underground tank separated from all buildings. Where, however, it is necessary to store petroleum inside a shop or dwelling-house, the best position is a well ventilated cellar, from which the oil may be drawn by means of a pump in the case of retail dealers. The worst place of all is under the main staircase.

The metal tank in which the oil is stored should be hermetically closed with the exception of an air hole which should be covered with very fine copper wire gauze. In the case of fire the oil in such a tank may all burn away without seriously adding to the conflagration, or may even escape ignition altogether. Of course, water must not be played into the tank as this would have the effect of floating out the petroleum. In every place where petroleum is stored, there should be a supply of sand and a shovel. This is useful, not only for absorbing any spilt petroleum, but also for extinguishing fire in its initial stage.



Courtesy, Engineering Magazine, New York

STEAM AUTOMOBILE ENGINE OF PARIS FIRE DEPARTMENT

The quantity of oil which may be kept in any place is unlimited, but in the case of gasoline it is governed by the conditions of the license, and varies according to circumstances. Users of motor cars are allowed to keep sixty gallons, which must be contained in two-gallon metal vessels.

The most important precaution is the exclusion of naked lights from the neighborhood of the petroleum. If only oil is present, it is sufficient to guard against a light being taken into the immediate vicinity of the vessel in which the petroleum is kept, but in the case of gasoline, an ignition may take place at some distance from the actual vessel if there has been any leakage, as the vapor is heavier than air and has a tendency to flow or drift with light currents of air to a considerable distance before it is so far diluted as to become uninflammable. For this reason a naked night should not be taken into any storeroom where spirit is kept or used, and care should be taken that there is no fire or light in the vicinity of such store or room. In general, the storeroom should only be entered during daylight, but if it is necessary to enter at night, a safety lamp such as is used in coal-mines should be employed. Some persons think that a lantern is sufficient protection to a light, but this is not the case unless every communication between the flame and the outside air is closed by very fine metal gauze as in the safety lamp.

An electric spark is quite as dangerous in producing vapor ignition as an open flame. Several fires have been caused by the ignition of petroleum vapor by means of the tiny spark given off by a textile fabric which has become electrified. If electric light is installed in any building in which petroleum spirit is stored or used, this should be done under the advice of an expert thoroughly acquainted with the special risks to be guarded against. Time will not permit of my doing much more than touching on the general principle which should underlie such installation. The lamps themselves should be enclosed in strong glass outer globes fitted on with an air-tight joint. The wires should be well insulated and should preferably be contained in metal pipes connected to earth. All switches and fuses should be outside the building beyond the reach of vapor unless they are of such special construction or are so enclosed in metal cases that the vapor cannot possibly reach he interior. In general no current-bearing part, that is, no metal part in connection with the source of supply, should be exposed.

As in the case of explosives, no highly inflammable material should be kept near the petroleum. In this connection it may be well to mention the danger which may arise from empty petroleum barrels. It is commonly supposed that the fire risk is at an end as soon as the barrel is empty, and such

* H. M. Chief Inspector of Explosives, who read this paper (slightly condensed) before the International Fire Prevention Congress at London, Eng., 1903.

barrels are deposited anywhere regardless of possible ignition. The wood being saturated with petroleum these barrels are often highly inflammable, and when they have contained spirit are generally full of vapor. Several accidents have occurred through mischievous boys putting lighted matches to the bung-holes of empty gasoline barrels.

A necessary precaution is to guard against petroleum, especially gasoline, finding access to the sewers. Not long ago I was called upon to investigate a curious explosion, fortunately not followed by a fire, which occurred in a dwelling-house in the North. The cause was traced to the washing out of partially emptied gasoline cans into the sewers, at a distance of about 200 yards further up the street. The vapor from the sewer had found its way into the house through defective drains. Special care should be taken where any large quantity of petroleum is kept, that there shall be no outflow of the liquid in case of fire. Where the tank is not underground, it should be surrounded by a trench or dwarf wall, or should be placed over a cavity capable of containing the whole of the liquid should the tank be damaged by fire.

Carbide of Calcium.

We now come to the consideration of the precautions to be taken with a chemical product, the importance of which is growing very rapidly, namely, carbide of calcium. Its principal use is in the production of acetylene, which is a gas having a very high illuminating power. Owing to the very simple method by which this gas is produced, and to the great brilliancy and whiteness of the light which it gives, it is specially adapted to certain kinds of illumination. The demand for carbide is therefore already considerable, and as the popularity of the light increases, the storage of this chemical will become more and more important. In this country the material has been subjected to restriction by bringing it within the scope of the Petroleum Acts, so that it is made illegal to store quantities greater than five pounds without a license.

Carbide of calcium is of itself absolutely inexplosive and uninflammable, and its sole danger lies in the readiness with which it gives off a highly inflammable gas from the mere contact of water or moist air. As long as the carbide is stored in hermetically closed vessels, therefore, it is quite harmless. Even if these vessels are exposed to fire in a burning building, no danger arises provided that the water is not played on the contents.

Acetylene, like all other inflammable gases, tends to form an explosive mixture with air, but it differs from other gases in the very wide range of proportions in which it is capable of forming such a mixture. Thus, when the proportion of acetylene in the air reaches 3 per cent., the mixture commences to be explosive, and continues to be so under certain conditions until the proportion is over 80 per cent. The maximum explosive force is reached when the proportion of gas to air is half and half. The reason for this wide range is to be found in the fact that the gas possesses explosive properties in itself without any admixture of air. When raised to a pressure of two atmospheres or even less, acetylene alone will explode with very great violence on the application of a flame or spark. For this reason the compression of this gas is not allowed in this country except under very special conditions,

From what I have said of the properties of carbide of calcium, it would appear that only one precaution is necessary for its safe keeping, namely, that it should be contained in a hermetically sealed metal vessel. This is indeed the principal precaution necessary, but inasmuch as it is difficult to ensure that vessels shall be at all times absolutely impervious to moisture, and as these vessels have generally to be opened at times for the removal of their contents, it is desirable also to add certain other precautions. The vessels in which the carbide is contained should be kept in some dry well-ventilated place and should be protected from the weather. No large amount of the material should be stored in any shop or dwelling-house, or in any highly inflammable building; and when a fire does break out in or near a carbide store, no attempt should be made to extinguish it with water if there is any likelihood of the carbide being wetted.

Excepting in the case of storage inside houses or shops, the quantity to be allowed in any one place is of little importance, because when more than a very limited quantity is kept, the danger is measured more by the amount of water which can find access to the material than by the amount of carbide present. In order to generate the full amount of gas from any quantity of carbide, it is necessary to add at least an equal weight of water. The precaution in regard to naked lights, which is all-important in the case of stores for gasoline, is not so necessary in places where carbide is kept, because if the precautions which I have just mentioned are observed there will not be much chance of the formation of gas, and what little is formed will be readily carried away in a well-ventilated building. Unlike gasoline, acetylene is of approximately the same specific gravity as air, and mixes easily with the atmosphere. A naked light should not, however, be taken near one of the carbide vessels when it is opened, as gas is sure to have accumulated inside, and it is wise to exclude them from the building altogether.

Other Chemicals.

It would be impossible within the limits of this paper to deal with all the numerous chemicals which under certain conditions are capable, directly or indirectly, of causing fire or explosion. Strong acids when they come in contact with certain other substances may develop sufficient heat to cause a fire, and it is conceivable that caustic alkalies may do the same. Quicklime, owing to the heat evolved in combining with moisture, has, I believe, often been the cause of fires, and the metals, sodium and potassium, give rise to still greater danger on the same account. It is well known that these metals burst into flame and even cause explosion on coming in contact with water or any substance containing moisture; but it was at one time doubtful whether exposure to moist air was sufficient to cause ignition. This doubt was set at rest by Dr. Dupre, Chemical Adviser to the Home Office, who carried out experiments at my instigation. He found that although the rate of oxidization of sodium in moist air was too slow to raise the metal to the temperature of ignition, yet the soda formed is so hygroscopic that drops of moisture accumate on the surface; and if one of these drops runs down on to a portion of the metal less oxidized, an ignition takes place. I believe this to have been the cause of a serious explosion which occurred in a small building in

the exhibition grounds at Earl's Court a few years ago, where both sodium and gunpowder were stored.

Another substance which gives rise to considerable fire risk on account of its affinity for water, is sodium peroxide. This chemical is used as a producer of oxygen, which it readily gives off when acted upon by water. When pure its behavior is somewhat remarkable. Dr. Dupre has shown that a piece of sodium peroxide if rubbed against the surface of a piece of wood will set it on fire, and if the peroxide in a powdered condition is sprinkled on wood shavings, a drop or two of water is sufficient to make the whole burst into flames.

The danger with those chemicals which I have described suggest their own remedies. Strong acids and alkalies should be kept out of reach of other chemicals, and care must be taken to confine them in their own containing vessels. Chemicals having a strong affinity for water should be stored in hermetically sealed receptacles, preferably of metal. Sodium peroxide must be kept away from wood or other carbonaceous material. The metals, sodium and potassium, if required for immediate use, may be kept in heavy mineral oil, but care should be taken that they are entirely covered by the liquid.

We now come to the class of chemicals, which, like petroleum, give off inflammable vapor. Foremost among these is bisulphide of carbon, which is used to some extent in the arts as a solvent. Not only is this extremely volatile, but it presents the additional danger that its vapor ignites at a comparatively low temperature. Several other liquids used as solvents give off inflammable vapor freely, as for instance, ethers, alcohols, acetone, amyl acetate, turpentine, etc. For all these the precautions in storage should be much the same as for gasoline.

The fire risk of phosphorus in the crystalline form is well known. This substance should invariably be kept under water. Prosphide of calcium, on coming in contact with water, gives off a gas—phosphoretted hydrogen—which ignites spontaneously in air. This chemical must, of course, be stored in hermetically sealed vessels, but, owing to its very dangerous nature, it should not be kept at all in any shop or dwelling house.

Some of the coal-tar products used in the dyeing trade possess explosive properties, but these are mostly of a feeble order, and the materials themselves are not as a rule highly inflammable. Picric acid, however, is capable, under certain conditions, of exploding with great force. Experience has convinced me that when any considerable quantity is involved in fire, a violent explosion may result, even when to metallic substance capable of forming a picrate is present.

The next chemical to be considered is chlorate of potash, which owes its uses to the fact that it is an efficient oxygen producer. It does not give up its oxygen except under the influence of heat or chemical reaction, and is therefore stable at normal temperature, and free from liability to spontaneous ignition. Its danger lies in the readiness with which it forms explosive mixtures with carbonaceous material, especially under the action of fire. Thus if, during a conflagration, melted chlorate became mixed with some powdered or melted organic matter, a serious explosion might ensue. In very large quantities it is capable of exploding by itself in the course of a conflagration, as was shown by a serious explosion at St. Helen's a few years ago. It also has the property of rendering any woodwork or fabric with which it has come in contact very highly inflammable, and where it is involved in a fire it will intensify the conflagration by supplying oxygen to the flames. Chlorate of potash and other chlorates should, therefore, be kept away from strong acids, and from any carbonaceous material with which it could possibly mix, and should not be stored in inflammable buildings. Saltpetre and other nitrates are also oxygen bearers, but are not possessed of explosive properties, nor do they readily form explosive mixtures. They are, however, capable of intensifying a conflagration, and of rendering woodwork more inflammable from a spark, though in a less degree than chlorate of potash. It is better, therefore, that nitrates should be stored in an inflammable building.

How They Fight Fires in Pekin

An interesting account of a fire in Pekin, the capital of China, has been told by a former resident of that city and will serve to illustrate the perfect lack of any appliances for fighting fires in one of the world's largest cities. "The flames broke out in the house next door to the one in which I was lodging. The first I knew of it was when the owner came out and said to the pedestrians, 'I wish to make the accouncement that my house is now on fire and God bless the officials of this city.'

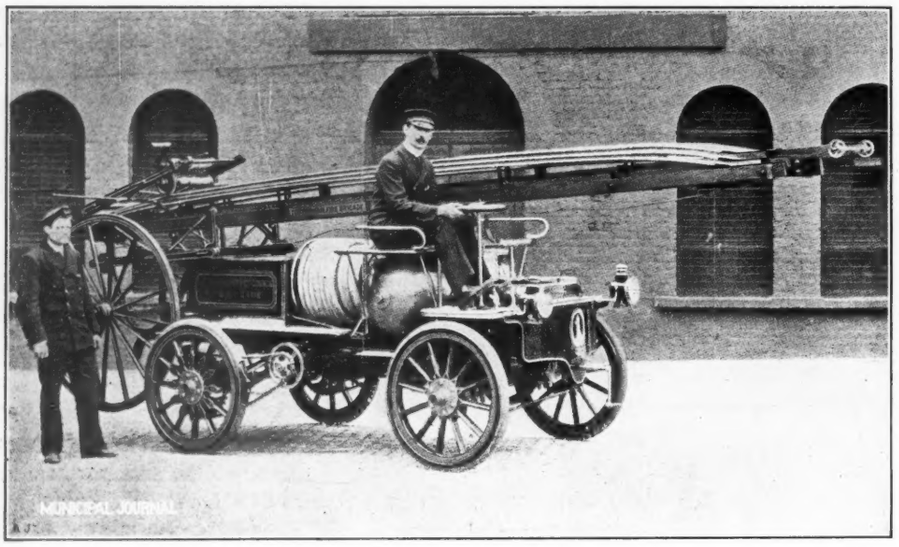
"A few people stopped for a moment, but there was no excitement. Bye and bye two policemen came sauntering up with about four quarts of water in a pail, and threw it against the front door. As this did not quench the conflagration raging in the second story, much to their astonishment, they said what I took to mean "nothing doing," and walked carelessly away. Not one piece of furniture was saved. The house in which I lodged soon took fire, but no attempt was made to put the flames, and when I made some effort the owner protestingly said:

"Why go to any trouble? If the house and all the things were not to be burned why did the fire come?"

"After trying to rally a crowd to fight the new flames, and not succeeding in raising a single recruit, I determined to save at least my own trunk, though I could not tell how the people would take it. No more policemen came, and after four houses had been burned down the flames died out for want of further fuel. I naturally felicitated myself on saving all my baggage, but next morning there was a change of tune. I was arrested on a charge of disturbing the peace, and after being locked up for twenty-four hours was brought to trial and fined what would amount to about $2.50 in our money. More than that, I had to furnish a bond in the sum of $100 that no more buildings next door to me should take fire during my stay. When I asked how I had disturbed the peace I was told that it was by dragging my trunk down stairs when I should have left it in the house to be burned as Providence had evidently intended. Indeed, the action caused them to look upon me as a hardened infidel, and for some time after that I had hard work to find lodgings or to compel civil treatment."

Chemical Motor Fire Engine

THE present combined motor fire engine and fire escape is in many ways a new departure, and is the first occasion on which a fire escape has been actually combined with a motor vehicle so as to be capable of being taken to the scene of a fire with a much greater degree of rapidity than is possible in the case of hand or horse drawn fire escapes. As will be seen from the illustrations, the combined apparatus consists of two independent machines, the fire escape proper, which is adapted to be mounted on the fire engine, and the motor chemical fire engine itself. The motor fire engine consists of a petrol vehicle, in the front of which, underneath the driver's seat, is mounted the chemical fire extinguisher, consisting of a large round-ended copper cylinder with a controlling hand wheel. The motor vehicle has a body and channel steel framing, the body providing accommodation for the hose pipe, an extra reel of which is carried immediately behind the driver's seat. The petrol engine, which is of the four-cylinder vertical type, mounted underneath the bonnet in front, develops twenty horse-power and is provided with mechanically operated inlet valves and low tension magneto ignition. The transmission to the countershaft, from which the rear wheels are driven by chains, is through a change-speed-gear of the sliding-spur-wheel type, constructed to give three forward speeds and a reverse. The transmission from the countershaft to the rear wheels is by Brampton one and one-half-inch pitch roller chains, and the steering-gear, operated from a wheel on a vertical pillar, is on the Ackerman principle. A powerful emergency shoe-brake acts upon the tires of the rear wheels and is operated by a hand-lever in front of the driver, while band-brakes controlled by a pedal engage with brake-drums on the ends of the countershaft immediately behind the driving sprockets. The wheels, which are of the artillery type, are shod with three and one-half-inch solid Clincher tires.



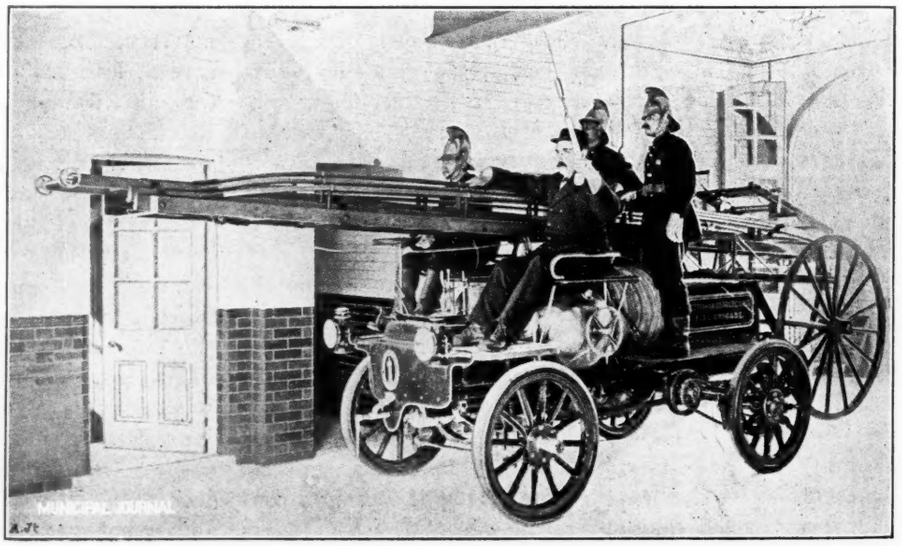
CHEMICAL MOTOR FIRE ENGINE OF TOTTENHAM, ENG.

The fire escape itself, which is capable of reaching to a height of fifty feet, is constructed on the sliding carriage principle.

The chemical fire extinguisher, which consists of a large copper cylinder with rounded ends underneath the driver's seat, is shown.

The interior economy of the extinguisher is as follows: The drum or cylinder itself contains a solution of twenty-five pounds of bicarbonate of soda in sixty gallons of water. Eighty fluid ounces of commercial sulphuric acid of 1.8 specific gravity are contained in the leaden bottle, the bottom of which bottle is closed by a thin metallic capsule, the bottle itself being mounted in a gun-metal receptacle. The gun-metal shaft on which the exterior hand wheel is mounted carries a fan or agitator, which serves to stir up the liquid and assist the evolution of the gas generated. This evolution is started by turning the handle, the crank of which, engaging with the vertical pricker, lifts it and carries it to perforate the metallic capsule, thereby permitting the sulphuric acid to flow from the bottle, into the soda solution and develop the gas.

At a test of the engine, three firemen mounted it and opened the doors of the station by pulling the overhead rope shown in the illustration. The engine then issued from the station within fifteen seconds after the alarm was given. After a run it returned to the station and answered a second call, getting to work on a building in twenty seconds. The hose from the chemical engine was run up to the roof, the motor engine, meanwhile, pumping water from a hydrant.



MOTOR ENGINE AND FIRE ESCAPE READY FOR A RUN

WHAT POLICE AND FIREMEN ARE DOING

Device for Fighting Cellar Fires—Elaborate Fire Protection at St. Louis Exhibition—Rules in San Francisco—Fire and Police Personals

What Some Scotch Police Are Paid

THE police of Goven, Scotland, have been granted an increase in salaries, the scales of pay being as follows: Constables, or patrolmen, third class, $325.52 per year; first class, $356.20; after two years' service in the first class the pay is to be $371.28, after seven years $417, and after ten years $432.12; sergeants on appointment are to receive $455 a year; after a year's service, $470.08; after four years, $500.24; inspectors are to receive $500 on appointment; $537.50 after two years' service; $612.50 and after eight years, $650 per year; lieutenants on appointment, $750; after three years, $825, and after ten years, $1,000.

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Fire Force of St. Joseph

ST. JOSEPH, MO., has been fortunate in having few fires during the past year. Chief Kane reported 311 alarms and 128 fires, with total losses of $35,994, well covered by insurance. Chief Kane recommended another hose company of five men with equipment for service in the stock yard district; additional men should be added to six other companies. The force now consists of a chief, assistant chief, twelve foremen, and fifty-four men. There are thirteen fire houses and thirty-six horses. About 5,000 feet of new hose are needed according to the chief. He also recommended that the local telephone company be compelled to put in a fire alarm system at once in accordance with its charter. All wires in the business districts should be underground and all buildings within the first-class fire limits and over a certain height should be thoroughly fireproof.

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Chief Sullivan's Device to Fight Cellar Fires

THE great difficulty experienced by all fire departments in cutting holes in floors of buildings, especially those of modern construction, where cement, tiling, etc., are used, has led Chief D. T. Sullivan, of the San Francisco Fire Department, to devise a method by which solid or whirling streams of water may be introduced into basements and at several points therein. This device is nothing more than a pipe casing of sufficient size sunk in ground floors of mercantile buildings at certain points and covered with a cap of peculiar design, which not only acts as a cover for the hole, but is manufactured so as to readily give the approximate location of the fire in basement, a touch of the fireman's hand thereon giving at once that important information, it very readily conducting heat. To the firemen of large cities where cellar fires of the "blind" variety is an an every day occurrence, this scheme will appeal most strongly. The city authorities have passed an ordinance compelling owners of buildings already erected, or hereafter to be erected in that city, and in which basements are being used or are about to be used for the storage of goods or merchandise of any description, to install the device mentioned, one to every 1,600 feet of floor surface. The ordinance goes further and prohibits the storage of goods in basements in such a manner as to prevent the possible use of the pipe casings to the best advantage.

It is the desire of Chief Sullivan that all shall have the benefit of his device entirely without cost for royalty. Its use will be absolutely free to all, as far as any patent rights are concerned, and he wishes this fact to be well known.

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Small Fire Loss in Wichita

MANY of the cities around Wichita, Kan., have suffered from serious fires during the year, but Fire Marshal A. C. Walden reported that Wichita has been singularly free. During the year the department responded to 146 alarms, three being false. The loss on buildings and contents aggregated $72,547.73. The largest percentage of fires was caused by gasoline stoves. The manual force of the department consists of thirty men, including the City Electrician and Fire Marshal, classified as: One marshal, an assistant marshal, four foremen, two assistant foremen, four first-class firemen, ten second-class firemen, six third-class firemen, a house boy, and electrician. The apparatus consists of an extra-size Metropolitan steam fire engine, a second-size steam fire engine, a double sixty-gallon chemical engine, a Babcock aerial turn-table ladder truck, three hose wagons, a hose reel, a wagon equipped with 500 feet of hose, two buggies, a deluge set. There are 3,500 feet of hose in fine condition and 2,000 feet in fair condition. A small amount of chemical hose will have to be replaced soon. There are 118 horses.

The water company has given better pressure than it was capable of when some of the wooden mains were in service. There are 256 hydrants located throughout the city and the pumping service is equal to any for a city the size of Wichita.

The Marshal's department has charge of the issuing of building permits and permits for electric wiring. He recommended that a law be passed to regulate and require the construction of fire escapes.

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Fire Protection at St. Louis Exposition

VISITORS to the St. Louis Exposition will be interested in the fire fighting service which has been installed on the grounds. A special department has been placed in service and, if the need demands, the regular fire department of St. Louis itself under Chief Swingley may be called upon. All the buildings have been supplied with standpipes and hose sections so that it will be unnecessary for the firemen to bring much hose to the scene of a blaze. There is a pressure of about 175 pounds on the hydrants and this can be increased half as much again if need be. Throughout the Exposition district twenty-four miles of water mains have been distributed, the city mains feeding these with water and fourteen large pumps supplying additional pressure. If, for any reason, the city supply should give out, the pumps on the Exposition grounds can take water from the large

lagoon, the capacity of which is placed at 9,000,000 gallons.

Automatic sprinklers have been distributed throughout the large buildings to further protect them from fire, and, in addition, for every 2,500 square feet of space there is a six-gallon fire extinguisher.

Chief Alex. P. Christie, assistant chief of the St. Louis Department, is in charge of the fire department at the Exposition. Under him are seven regular companies, reinforced by twelve companies of the city's department that may be called into service. The seven companies include about 100 men, who have the latest style of apparatus, including two water towers, a hose truck and four engines. The men have been on the grounds since they were laid out and so are familiar with them. If it is necessary to call on St. Louis, and Chief Swingley responds, he will take command of all. The grounds are equipped with some 232 keyless fire alarm boxes on ten circuits, all underground. A police signal system of 100 boxes has been installed by the Signalphone Company, of Milwaukee.

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Theater Fire Rules in 'Frisco

Rigid rules for the safety of theater-goers in San Francisco, Cal., have been compiled and are being enforced by Chief Sullivan. A digest of the rules follows: Firemen so detailed must report their arrival at theaters one-half hour before performance begins and they must telephone when the performance closes. Fire curtains must be tested before each performance and their failure to work must be reported at once. Firemen must maintain their positions, except between acts, when they are to alternate in visiting all rooms used during performance. Except when used as properties, smoking and lamps of any kind are prohibited. All hose must be stretched in place during performances. Before leaving theaters, the fire curtains must be lowered and an inspection made.

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Work of Birmingham's Police

Considering the large amount of territory to be patrolled by the police of Birmingham, Ala., Chief Weir felt justified in asking in his report for a substantial increase in the number of his officers. He asked for some twenty-five in his last report, but was allowed but ten, so this year he recommends that the lacking fifteen be allowed. He also recommended that the Bertillon system be installed and that the city be made a member of the National Board of Identification. Birmingham is a city to which would be attracted many bad characters, as they are attracted to all places of activity and rapid growth, but the energy of the force has kept good order and afforded good protection to the citizens. The number of arrests for the year 1903 were 623 less than for 1902. The detective branch and the mounted service have given the best of satisfaction. While the general conduct of the force has been good and no scandals of any magnitude have taken place, it has been necessary to discipline a few men for small acts and neglect of duty, seven men having received punishment.

He asked that the eight hour system be installed, giving as his reasons the length of patrol of twelve hours, the fact that under the old system officers had to leave their beats for meals, and the inability to increase the night force from the day force. The probation system introduced among the negro boys by one of the judges has wrought wonderful change for the better and has saved the police great annoyance from this class of lawbreakers. It has been proposed to adopt this plan for street walkers and vagrant women.

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Fire and Police Personals

—The volunteers of Wilmington, Del., elected as chief William H. Stilley.

—The Fire Department of Little Falls, Minn., re-elected George Emder chief.

—The Council of Joplin, Mo., appointed Aaron Haughton chief of the Fire Department.

—The Council of Montclair, N. J., has appointed Frederick E. Williams fire chief to succeed Morris F. Gardner.

—Chief Ryan, of the Norfolk, Va., Fire Department, has been considering establishing a training school for his men.

—F. M. Stahl has been appointed chief of police of Topeka, Kan., by Mayor Bergundthal, to succeed Chief A. E. McCollum.

—Mayor Silas Cook, of East St. Louis, Ill., appointed George O. Purdy chief of police, and Thomas Van Dyke, chief of the Fire Department.

—The Board of Wardens and Burgesses of Nautatuck, Conn., has elected J. B. Fuller as chief of the Fire Department, superintendent of fire alarm, and fire marshal.

—In his report to the West Orange, N. J., Council, Fire Chief James Sheehan stated that a ladder truck was necessary, as the ladders in service were not long enough to reach to the upper floors of buildings.

—Director Moore, of the Department of Public Safety, Pittsburg, Pa., has issued a statement claiming that certain councilmen have determined on his removal because he would not grant them privileges contrary to law.

—At the request of the President of new Street and Water Board of Jersey City, N. J., Police Chief Benjamin Murphy has started a crusade for the cleanliness of the streets, residents having made many complaints about the dirty condition of the pavements.

—Chief William T. Belt, of Washington, D. C., Fire Department, was presented by the members of his department with a group photograph, sixty inches long by fifty inches wide, containing portraits of all the officers and men and pictures of all the stations and apparatus.

—The Cleveland, O., Board of Public Safety has commended both Chief Frederick Kohler and Fire Chief George A. Wallace on their work. In his report, Chief Wallace urged that a pipe line be run from the Kirtland station of the water works along the lake front, that better protection be given these valuable properties.

—At a recent meeting of a citizens' association of Washington, D. C., Chief of Police Richard Sylvester spoke on his long service in the department. He also touched upon the small size of the department, which should be the best in the country, as it is in the capitol city. He also stated that the pay of the policemen was entirely too small to induce good men to stay in the force.

LITERATURE ON MUNICIPAL TOPICS*

Reviews of Some Important Books—What the Magazines and Reviews Have to Say About Civic Affairs—Municipal Reports Received

Books

The all-absorbing topic in political thought in the country at present is the discussion of the trusts and a work on these combinations by as well-known and authoritative writer as John Moody will be received with interest by all. In *The Truth About the Trusts* he speaks of the trust as follows: "The modern Trust is the natural outcome or evolution of societary conditions and ethical standards which are recognized and established among men to-day as being necessary elements in the development of civilization."

The introduction to the book states its purport and defines the trust. The second part of the volume is devoted to the "Greater Industrial Trusts," of which there are seven with a capitalization exceeding $2,660,000,000, describing them in detail and analyzing their positions. "The Lesser Industrial Trusts" take up the third section and this is followed by the "Industrial Trusts in Process of Reorganization." The fourth and fifth sections take up "The Greater Franchise Trusts" which will interest the city officials as they come in direct contact with these combinations. A general review of the trust movement such as is given will be of interest to the general public. The volume is embellished by charts and maps which vividly present many important features. Buckram, 540 pp., $5 net, postage 27 cents.

♣

The success met with by the first edition of *Tanks and Towers for Water-works,* by J. N. Hazlehurst, has led the author to revise and enlarge the work for a second edition just published. In as much as cities, large and small, are rapidly putting in their own water-works, and inasmuch as a large proportion of these works include tanks instead of reservoirs, information concerning their construction is greatly needed by the city engineer or superintendent of water-works who has charge of the installation or supervising power over the contractor. The instructions under which the engineer works are usually so meagre and general, specifying only the dimensions of the tank or stand-pipe, that, unless he has had experience in their construction, he is at sea and must depend on the good faith of the contractor.

With the foregoing difficulties in mind and having personally experienced the trouble incident to securing reliable information along these lines, the author compiled the first edition. The second edition has profited by the criticisms and suggestions brought out by the first and has been largely rewritten and three new chapters have been added. Thus, a record of stand-pipe failures has been added; a chapter dealing with the stresses in a steel tower; and two chapters on specifications and on the possibilities of introducing architectural and ornamentative features in these towers. With these additions the subjects taken up in the chapters are as follows: An historical review; chemical and physical properties of structural metal; structural metals, their cost and use; stress or strain, and stability of structure; mechanical principles in stresses, bending, etc.; stresses in a steel water-tower, riveting, designing, foundation painting, shop practice and erection of towers, model specifications and general discussion, architecture and ornamentation. Cloth, 8vo., 325 pp., 60 cuts, $2.50 net, postage 15 cents.

♣

A brief summary of the works of authorities on the history of Venice is *The Oligarchy of Venice,* by Hon. George B. McClellan, mayor of New York. It does not deserve the name of a history of that city and the author does not claim such an appellation, as he calls it an "essay." In some 200 pages he skims over the whole fourteen centuries of Venetian life and history, but it cannot be said that he has added anything new to the literature on the subject. It seems more the work of the student who has read up on his subject and then extracted such points from all the authors as would make up his story. His remarks on the Venetian oligarchy are, in one way, amusing, inasmuch as Mayor McClellan owes his present position to the New York oligarchy known as Tammany Hall, which, like its predecessor in Venice, works for its own pockets all the time. "As long as Venice (the ruling class) was true to the real interests of the republic, she prospered; when she was false to them, she fell."

Notwithstanding the above, this essay will be of interest and an outline history to the many thousands who know little or nothing about that great city of canals, at one time the most powerful in the world. Cloth, $1.25, postage 10 cents. h.

♣

THE Assessment Commissioner's Department of Hamilton, Canada, has published a hand-book which is a guide of special interest to visitors of the city. It gives short reviews of the city's departments, its commerce, paving, and general description of the city and its attractions. The Assessment Commissioner, Mr. John T. Hall, can be addressed for any further information not included in this folder.

♣

Fire and Explosion Risks, by Dr. Von Schwartz. A handbook dealing with the detection, investigation, and prevention of dangers from fires and explosions of chemicals, etc. Cloth, illus., 357 pp., $5 net. v.

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Method of Calculating the Cubical Contents of Excavations and Embankments, by J. C. Trautwine. Including cost of earthwork. Eleventh edition, cloth, illus., 71 pp., $2. v.

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Engineering Contracts and Specifications, by J. B. Johnson. Synopsis of the law of contracts. Third edition, cloth, illus., 566 pp., $3 net. v.

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Drainage Engineering Notes. Compiled by the Civil Engineering Department of Iowa State College, Ames, Ia.

* Any book or periodical reviewed or mentioned in THE MUNICIPAL JOURNAL, or elsewhere, will be sent to any address on receipt of price.

Paper, 10 pp., tables for determining the sizes and grades of tile drains and ditches.

Periodicals

The fifth of a series of investigations into the school systems of the country made by Miss Adele Marie Shaw, appears in the May *World's Work* under the caption *From Country School to University,* in which the author outlines the school system in operation in the State of Indiana. She stated that the excellence of the system was due to the superior character of the teachers, not only in the cities, but in the country districts as well. In the same issue, Franklin Matthews writes in *A Day's Work of the Mayor of New York* about what the present incumbent, Hon. George. B. McClellan, has to do in his responsible position. New York, N. Y. Price per year, $3.

Allen Hazen, C. E., contributed to the April issue of *Proceedings* of the American Society of Civil Engineers, a paper *On Sedimentation* and H. deB. Parsons, C. E., wrote on *The Collapse of a Building During Construction.* New York, N. Y.

The Arena for May included an article by Hon. F. F. Ingram, Commissioner of Public Lighting in Detroit, on *Municipal Ownership and Operation vs. Private Ownership or Control.* The keynote is that public business belongs to the public and should be operated by it; private business must remain in the hands of private concerns. The corruption in public life is due to the private control of functions that are essentially municipal. The author is also opposed to municipal ownership with leasing to private concerns; this he considers worse than private ownership and cites the revelations in Toronto in respect to the railway in that city. Trenton, N. J. Price per year, $2.50.

The eighth of a series of articles on "Civic Renaissance" by Charles Zueblin running in *The Chautauquan* is on *Washington, Old and New* and takes up the development of the city's plan and the ideas worked out by the last commission towards the carrying out in part of L'Enfant's original plan brought down to date. Springfield, O. Price $2 a year.

Value of Tests for Bacteria of Specified Types as an Index of Pollution. Report of State Board of Health, Massachusetts, 1902.

Purification of Potable Water by Means of Ozone, by Dr. Gg. Erlwein. A translation of paper read before the Deutscher Verein von Gas-und Wasserfachmaennern, 1904. *Scientific American Supplement,* New York, April 30, 1904.

Synopsis of the Fourth Report of the Royal Commission on Sewage Disposal. The Contract Journal, London, Eng., April 20, 1904.

Progress in Construction of the Jerome Park Reservoir. New York, N. Y. Engineering Record, New York, April 23, 1904.

Sewage Dispsal Works and Experiments at Andover, Mass. Engineering Record, New York, April 23, 1904.

A Schedule of General Clauses to Be Used as a Guide in Drawing Specifications. Engineering News, New York, April 21, 1904.

New Telephone Exchange in Berlin, by Emile Guarini. *Scientific American,* New York, April 23, 1904.

Tullahoma, Tenn., Water and Light Plant, by Granbery Jackson, C. E. *Transactions,* 1903, Engineering Association of the South, Nashville, Tenn.

Why Municipal Reform Succeeds in Chicago and Fails in New York, Editorial. *The Independent,* New York, April 24, 1904.

Acetylene Town-Lighting in Various Countries and Towns. Acetylene Journal, Chicago, April, 1904.

More Light on the Theory of Concrete, by S. B. Newberry. *Progressive Age,* New York, April 1, 1904.

Electrolysis of Gas Pipes. American Gas Light Journal, New York, April 4, 1904.

Gas and Electric Lighting Compared. Journal of Gas Lighting, London, Eng., March 15, 1904.

Lighting of Streets in Westmister (Tests of Lamps). J. W. Bradley. *Journal of Gas Lighting,* London, Eng.. March 15, 1904.

Prevention of the Electrolysis of Gas Pipes, by A. Ross Gray. *American Journal of Gas Lighting,* New York, April 11, 1904.

The Electricity Works and Destructor of the Metropolitan Borough of Hackney. Serial beginning March 11, 1904, in *Electrical Review,* London, Eng.

Gas Power for High-pressure City Fire Service, by J. R. Ribbons. *Cassier's Magazine,* New York, March, 1904.

Some Portland Cement Practice. American Manufacturer and Iron World, Pittsburg, Pa., April 7, 1904.

Machine Mixed Concrete as Applied to Street Work, by D. G. Fisher. *Engineering News,* New York, March 10, 1904.

Details of Street Pavements in Salt Lake City, Utah. Engineering Record,. New York, March 26, 1904.

The Use of High Pressure Gas in Street Lighting, by J. J. Knight. *American Gas Light Journal,* New York, April 11, 1904.

The Dunedin, (New Zealand) Tramways. Street Railway Journal, New York, April 2, 1904.

The Cleaning and Flushing of Sewers. Engineering Record, New York, March 12, 1904.

A Large Concrete and Brick Storm Sewer in Newark, N. J. Engineering Record, New York, March 12, 1904.

Sewage Pumping Plant for the Jackson Park Avenue Sewage District at Chicago. Engineering News, New York, March 31, 1904.

The Preservation of Wood from Fire and Decay, by Joseph L. Ferrell. *Journal,* Western Society of Engineers, Chicago, February, 1904.

Protection of Steel from Rust by Concrete, by Charles L. Norton, from report of Insurance Engineering Experiment Station. *American Manufacturer and Iron World,* Pittsburg, Pa., March 10, 1904.

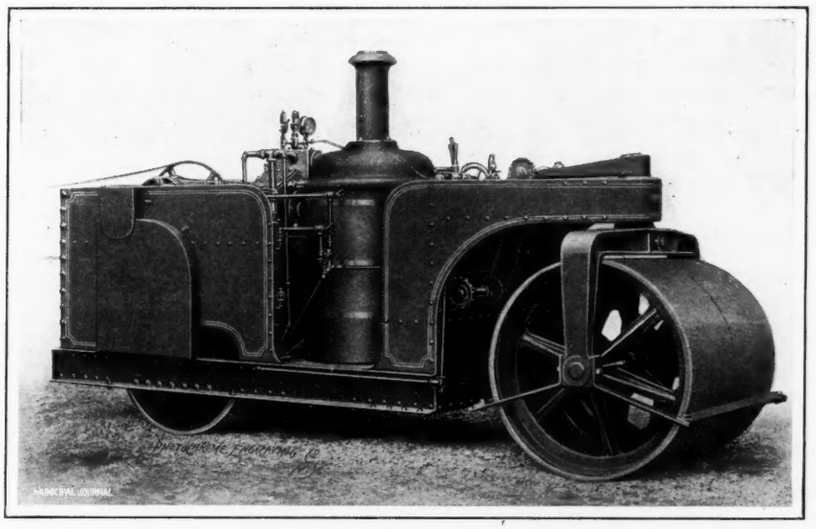
Hollow Block Concrete Wall Construction, by H. W. Cowan. *Railway Age,* Chicago, March 18, 1904.

Water Purifying Plants in Germany. Railway and Engineering Review, Chicago, March 12, 1904.

Modern Road Rollers

THE two steam road rollers which illustrate this article are manufactured by the American Road Roller Company, Groton, N. Y., and now form part of the long line of machinery built by this firm as aids in the proper construction of pavements and highways.

The 20,000-pound roller having a horizontal boiler is of the three-wheel type, and is so constructed that the compressing power on the rear and forward rollers is well nigh identical. This equalization of the weight enables a better road to be built than if the machine were abnormally weighted in the rear. By dividing the weight as equally as possible the whole width of both rear and forward rolling wheels becomes effective as a compressing power and facilitates in a great degree the construction of the road. Most steam rollers are so arranged that a very light weight is placed on the forward wheels, and this is most surely a serious mistake. It has been the special care of the American Road Roller Company to avoid this error in all their different styles of rollers, and many expressions of approbation from their customers have been received relative to this improvement.



Compensating or differential gearing has been made part of the 20,000-pound roller, and the ease with which the machine can turn sharp curves consequent on the addition of this gear is remarkable and most satisfactory.

The American Road Roller Company intend adding compensating gear to all the rollers it builds in the future, experience having shown that differential gear is quite as necessary on a steam roller as on a traction engine. This Company is in America the pioneer in this improvement as in many other useful devices which form part of rollers they build.

The boiler of the 20,000-pound roller is of the locomotive type, is fitted with a dome for the creation of dry steam and the prevention of priming. Double steam jacketed cylinders are used and live steam entirely surrounds them. Radial valve gear gives correct action and equalizes cut-off. Locking pins to the driving wheels are dispensed with and are rendered valueless by reason of the compensating gear, which can be thrown out of action at a moment's notice.

There are facilities, which no other roller possesses, for removing or replacing the rear axle for babbiting or for other purposes and without disturbing any other part of the machine.

The fire door is unobstructed and is of easy access for inspection or for cleansing of the fire.

The diameter of the rear rolling wheels is five feet and the extreme width of the machine is six feet over all.

The highest grades of material and workmanship are used in the construction of this roller, and the machine can be fitted with steam steering apparatus whenever it is desired.

The General Purpose roller also illustrated on this sheet weighs from six and one-half to nine tons and has a vertical boiler and horizontal double cylinder. The center of gravity is kept well below the danger line and this arrangement is a conspicuous feature and improvement of this roller. The roller wheels are of the same diameter fore and aft, and the boiler, being placed in the center of the machine, allows the weight to be distributed equally on the rolling wheels. The engines are placed in the center of the width of the machine, and this equally balances the weight from side to side.

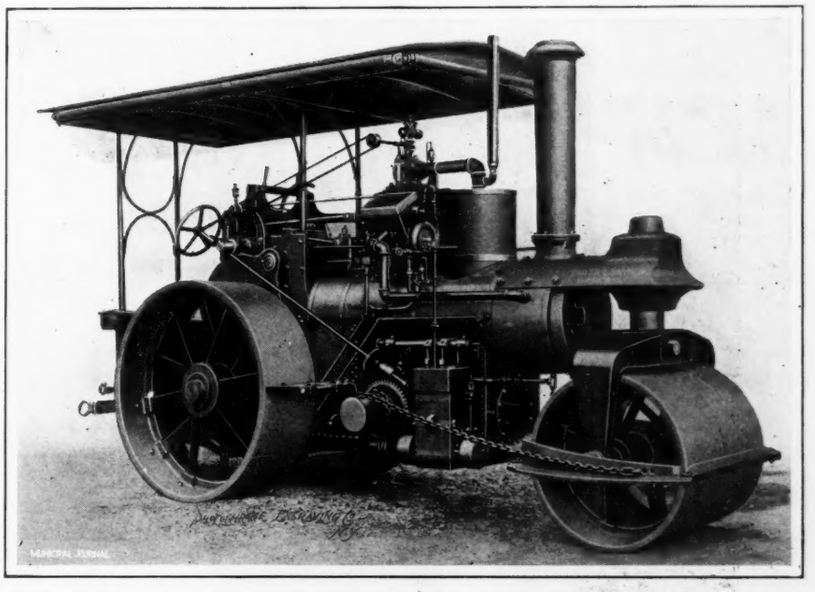
A pulley can be attached to the machine on either side for driving fixed machinery and a fast and slow speed gear, which enables the machine to travel at the relative speeds of four and two and one-half miles an hour is a feature exclusively used by the American Road Roller Company in its description of roller.

The American Road Roller Company's offices are at 156 Fifth avenue, New York City, with branch offices in Chicago, in the Chamber of Commerce Building, and in the Betz Building, Philadelphia.

Austin Patrol Can Cart

THE Austin "Patrol Cart" is used in cities as a scavenger cart, worked on the streets. Each cart is provided with a number of barrels or cans, which are stationed at convenient points, and when the workman or sweeper has filled a can he exchanges it for an empty one, leaving the full one at a point from which the contents can be conveniently emptied into a wagon and hauled away.

Street cleaning commissioners and superintendents in large and small cities consider these patrol carts a necessity. Heretofore bags have been used, but now the galvanized steel can is meeting with greater favor, as it is found cleaner and more serviceable. No better proof of this can be given than the fact that New York City has discarded the bags entirely, and is using galvanized cans in their place, and other cities are doing the same.



These carts are strong and durable and are made of steel throughout, except the castings, which are malleable iron. Full particulars and price-list will be sent to any address on application to the Austin Manufacturing Co., Manhattan Building, Chicago, Ill. Also, full information about street sweepers, sprinklers, earth handling machinery, etc., will be given.

Cement Pavement Work

PROBABLY twenty-five per cent. of the Nazareth Portland Cement (as sold by the Charles Warner Company, Land Title Building, Philadelphia, Pa.), used this year, will be for cement side-walks.

This is not because Nazareth is any the less adapted for other classes of work, but because a side-walk, of all cement work, will develop faults and show signs of wear the quickest; and cement workers recognizing this, demand the very best cement to be had.

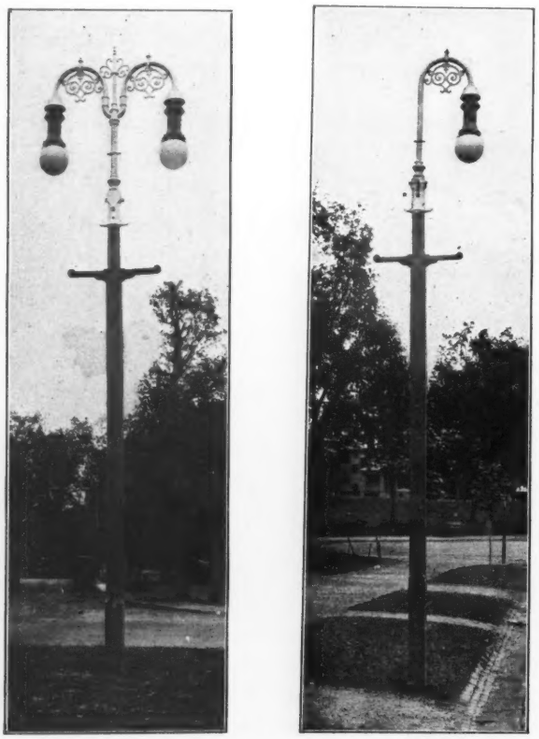
In addition to this, the fine texture and smooth working qualities of Nazareth permit of a beautiful finish, and the color is always uniform—a dark, bluish gray. In this connection it is pertinent to state that Nazareth is shipped from one mill only, insuring that every bag is uniform in quality and color.

One hundred thousand square yards of pavement were laid with Nazareth Portland cement at the National Capital last year; in fact, Nazareth was used exclusively for all cement pavements laid for the District of Columbia, during 1903.

Lundin Ornamental Arc Lamp Poles

ORNAMENTAL street fixtures have been given too little consideration by American municipalities. Transportation, lighting, telephone and telegraph companies have not only been given valuable franchises—in many instances free—but have been permitted to disfigure the streets with ugly poles. This is unnecessary and detrimental to the prosperity of any town or city. Mayors, aldermen and street officials should see to it that ugly poles are replaced with ornamental fixtures. Such fixtures are made by the Lundin Electric and Machine Company, 176 Federal street, Boston, Mass. The accompanying illustrations show the ornamental arc lamp poles made by this Company.

These poles are used by a large number of electric lighting companies for supporting arc lamps in streets and public parks. They



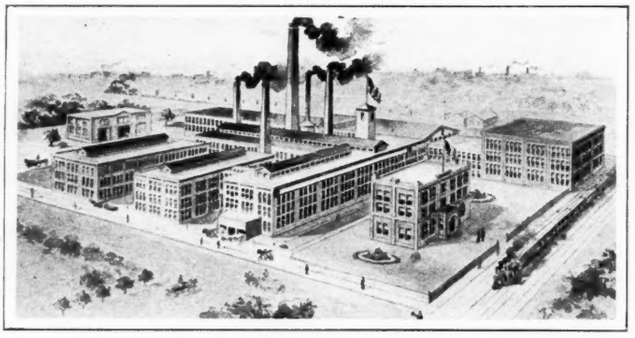
ORNAMENTAL ARC LAMP POLES

are very ornamental, well made and reasonable in price. The standard height of the pole when set in the ground is 24 feet over all. It is made for either high or low tension services. The pole is made of hard pine, octagon in shape and a hole is bored through the center to receive cables for underground services. For overhead services two brackets are attached to the pole at the base of the goose neck to receive overhead wires. The base of the goose neck contains an absolute cutout to cut out the arc lamp, thus insuring perfect safety to the trimmer while working on same. The wires from the switch to the lamp run inside of the goose neck which protects them from rain or snow. The arrangement for supporting the lamp is such that vibration will not break the inner or outer globes. The lamp hook is supported by a spring.

The Chicago Fire Hose Company

In a recent issue of the "United States Trade Reports" there appeared a long descriptive article of the Chicago Fire Hose Company, Chicago, Ill., from which the following excerpt is made:

"The Chicago Fire Hose Company is to be congratulated for having perfected such an efficient, reliable and durable make of hose,



PLANT OF CHICAGO FIRE HOSE COMPANY

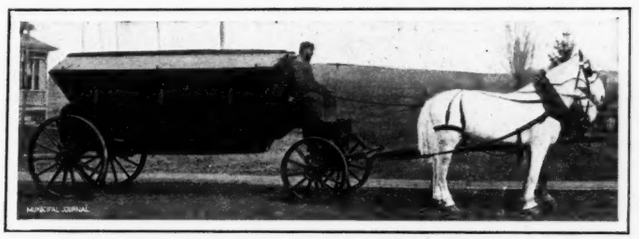
and they are well worthy of the widely-extended patronage which they enjoy. A great majority of the fire department officials in all parts of the country are now placing their hose orders exclusively with the above mentioned company, because they have learned by experience where to purchase hose that will give the best and most reliable service. And it is a most important matter, as hose of an inferior quality has no place in any fire department. The hose is one of the most important essentials used in fire-fighting, and where valuable property is being consumed by flames, weak, inefficient, bursting hose can delay the work of the department more than anything else could do. We ourselves have seen practical illustrations of this fact at fires, and have noted the serious inconvenience to which the firemen were put by hose which some penny-wise-and-pound-foolish fire board trustee had insisted upon purchasing because it was a few cents cheaper than a good quality of hose would be. The purchasing of fire department equipment and supplies should never be governed by any penurious ideas.

"There is too much valuable property and stocks of merchandise at stake in a fire to warrant any fire department trustee holding out or insisting upon the purchasing of any supplies or appurtenances of an unknown make or inferior quality, and simply because they may be offered at less prices or estimates than those made by some leading, reliable firm or concern with an established reputation for business integrity, and whose products have been time-tested and fire-tried long enough to prove their quality and efficiency; and such is the record of the Chicago Fire Hose Company, and while the United States Trade Reports has no interest whatever in indorsing this concern or its goods, beyond that of giving credit where credit is due, we would advise every fire department board of trustees, or chief, when in the market for high-grade hose, to investigate the merits possessed by the cotton, rubber-lined hose made by this company before closing any contracts. We can assure you that this hose, while not perhaps the cheapest in cost price, is the most economical and most reliable that you can purchase."

Syracuse City Officials Visit Wagon Works

The readers of the MUNICIPAL JOURNAL AND ENGINEER will be interested in an account of the visit of the leading city officials of Syracuse, N. Y., to the plant of the Haywood Wagon Company, Baldwinsville, N. Y., which appeared in a recent issue of the *Farmers' Journal* of Baldwinsville.

It so happened that on the day of the visit of the Syracuse offi-



FIVE-YARD HAYWOOD ASH WAGON AFTER LOADING

cials the company made the largest shipment of wagons since the plant began operations a year ago, fourteen carloads in all, which included twenty-one wagons for Syracuse. In referring to this visit the paper said:

"The city fathers were accompanied by many prominent business men from Syracuse, including contractors and coal dealers. A number of our citizens had been invited by the company to be present, and officers of the company carefully explained to their local and out-of-town guests the mechanism of the dumping devices and other parts of interest on the various types of wagons.

"After the wagons had been examined the guests were shown through the works and warehouses, the process of manufacture being explained through all the several processes in the different departments, after which refreshments were served in the office.

"The Syracuse order consisted of eleven ash wagons and ten wet garbage wagons. The ash wagons have large flanging tops with close-fitting covers to prevent the contents from blowing out, and will hold five cubic yards of ashes or dirt. They weigh about 2,500 pounds. The pulling of a lever by the driver opens a hopper at the bottom, almost instantly unloading the contents. The wet garbage wagons consist of a long steel tank body with airtight covers. By a simple yet effective arrangement the setting of the brakes upon the rear wheels and the driver backing his team, the 600 gallons of contents are discharged over the rear axle. This style of wagon is built in the most substantial manner and is the most sanitary wagon for handling garbage yet devised. Its weight is 2,400 pounds.

"The city officials were greatly pleased with their purchase and all

HAYWOOD 600-GALLON STEEL GARBAGE WAGON DUMPED

of the guests of the company expressed their highest approval of the safety and economy made possible by the use of the wagons.

"The Haywood Wagon Company was organized last summer with a capital stock of $30,000, the stock being divided into $30,000 preferred stock and $100,000 common stock. E. I. Edgecomb, of Syracuse is president of the company; Walter A. Cook, of Frankfort, N. Y., is vice-president; Frank J. Webb, of Syracuse, secretary; and L. L. Cramer, of Baldwinsville, treasurer.

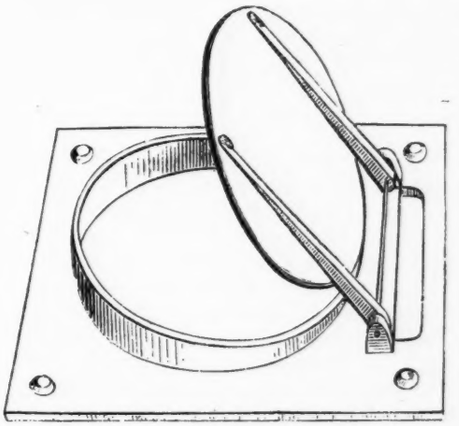
"The board of directors is composed of the above officers and James R. Shea, of this village. John W. Haywood, of Syracuse, is general manager.

"The company manufactures contractors' dump carts and wagons, asphalt and garbage wagons, stone spreaders, and rear end dump wagons for coal and garbage. All of their various styles of wagons are built of the best materials obtainable, by skilled workmen. The bodies of ash wagons, such as built for Syracuse, are made of the best quality of oak, ash and birch, with doors of wood and steel. The running gear is solid and substantial, capable of holding up the heaviest loads possible to put on the wagons. The wheels are built with birch hubs, with best quality selected oak for rims and spokes.

"The wagons are built under patents granted to Mr. Haywood and are acknowledged by all who are familiar with the conditions under which they are used to be the best of the kind upon the market. The company is steadily increasing its capacity, and now turn out about fifteen wagons and carts weekly. They now employ about forty men, with a weekly pay roll of over $300. With large orders ahead, a constantly increasing demand for their product and no competition, the prospects for the future of this concern is indeed bright and the village is congratulated upon having it located here."

Lenhart Automatic Sewer Trap

THE numerous epidemics of typhoid and other dread diseases the past two or three years have only served to emphasize in the public



mind the absolute necessity of constantly guarding the public health against attacks of this character by exercising every possible precaution, sanitation in sewerage systems being one of the most important.

Herewith is shown a cut of one of the Lenhart patents, an automatic sewer trap valve. It is designed for use at receiving basins and in trunk sewers. It allows the free flow of water and waste matter, but any back pressure immediately closes the trap and makes it air and water tight, thus instantly preventing the sewage and poisonous gases returning into the pipes.

The Perfect Sewer Trap Mfg. Co., of 61 Beekman street, New York, is the owner of the Lenhart patents. The company also makes traps designed for public and private buildings in which the same principle is used. Many traps, similar in purpose, are on the market, but the important advantage claimed for the Lenhart patents is that the trap is made of a non-corrosive composition, the process being secret, which not only makes them durable, some of them having been in actual use for eleven years, but prevents any interference in their working by reason of the accumulation of rust and grease. Public buildings in New York, Philadelphia, Albany, Syracuse, Elmira, Pittsburg and other cities have been equipped with these traps. As an invention in the direction of better sanitary conditions the Lenhart patents occupy an important place.

The Modern Dumping Wagon

IT is obvious that a dump wagon to be a success must be so constructed as to avoid the possibility of stalling on the dump and be capable of dumping the load clearly and quickly. It must be built low to facilitate loading, either by hand or by machine, and have means for easy closing after dumping. It should have short wheel base to give light draft and should have as tight a bottom as is possible to make in two sections.

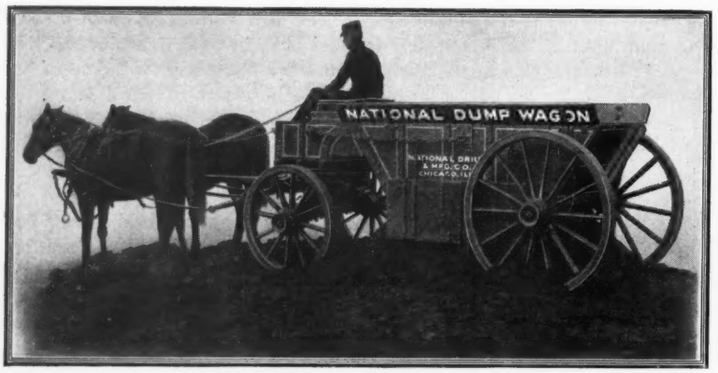


FIG. 1—THE NATIONAL DUMP WAGON IN OPERATION

In the National wagon, owing to the peculiar means by which the doors are fastened to the sides, it is practically impossible for the wagon to become stalled by reason of the doors catching on the dump when dropped. Figure 1 shows the doors hung from the outside of the box by means of two loops hanging in the two perpendicular slide guides on the outside. It will be seen that the load when dumped forces the doors out and up on the outside of the box, clearing the ground by about eighteen inches in most cases.

Figure 2 shows the wagon with the doors sliding up the outside of the box. Again the dump is absolutely clear, because when the doors are open they swing from the outside and do not choke the opening, as in the case of doors which are hung from chains or rigid hinges attached to the outside. The action is instantaneous, as the doors are released by one motion of the hand lever. Owing to the ample clearance between the ground and the lowest point of the doors when dumped, it is possible to build the box low down and at the same time retain the shot wheel base.

The illustration shows the standard contractor's wagon, with fifty-inch wheels, from which it will be seen that the top of the box is just high enough to clear the top of the wheel, making it easy to load either by hand or machine. To close the doors only one-half a revolution of the chain shaft is necessary, taking about one-third the effort required by the old-fashioned chain-hinged wagon. The short wheel base and the consequent light draft are due to the fact that the wagon is carried low. Some makers of dump wagons are forced to raise the box on brackets in order to clear the ground, consequently build the box long in order to get the capacity. The result is heavy draft.

FIG. 2—WAGON WITH DOORS IN NORMAL POSITION

Another advantage of this wagon is the tight bottom. The joint between the doors themselves and between the doors and the box possible to obtain in a bottom dump wagon. This would be impossible if inside hinges or chain hinges were used, and is an important feature, particularly in the case of a wagon desired for city use where even a slight leakage is objectionable.

The National is made by the National Drill and Manufacturing Co., of Chicago, Ill. This concern makes a specialty of road-making machinery, earth-handling tools and well-drilling machinery.

The "Banner" Dump Wagon

THE Studebaker patent "Banner" dump wagon is designed for city contractors' use, for hauling cobble stone, brick, gravel, crushed stone, wet or dry clay, asphalt, macadam, and all kinds of paving materials. The box is square, smooth, and clear of any obstruction on the inside. The trap and chain device by which the doors are operated work altogether on the outside; consequently, when the doors are released or opened the load is dumped completely, nothing remaining in the box.

The wagon is also especially adapted for spreading crushed stone, or other materials, to any desired quantity. The doors, when released, automatically lift and fold against the outside of the box, so that when the contents are dumped, the wagon cannot be stalled as a result of the doors being caught in the material dumped. An extra lever, or friction pulley attachment, is placed at the front end, whereby the trap doors can be regulated to spread the load over the ground as desired. Other features are the hinged top boards, which expedite the loading of the wagon by shovel from the ground, and the chain and hook attached to rear end of wagon, for trailing purposes.

These features render the "Banner" dump wagon of the greatest service in asphalt or macadam street paving, and will commend it to contractors in street work generally.

Hound front gear, with either neck yoke or chain pole. It has the oscillating fifth wheel, which will allow the front wheel on either side to drop into a depression in the roadway without disturbing the level of the body. Gear is painted red, body green. Can be furnished, at extra cost, with brake, steel lining, steel and asbestos lining.

In England, in 1901, there was a death rate from typhoid fever of 1.55 per 1,000; in Paris, 3.91, while in Hamburg the rate was only .33. It is an old saying that for every such death some one should be hanged, but it is almost impossible to arouse the truer perception that every case of typhoid fever represents, in reality, a crime somewhere, and somebody has been guilty of criminal negligence, which should be brought home to him.—*"American Medicine."*

Vehicles at the Exposition

THE accompanying illustration shows a train load of vehicles shipped to the General Service Company, St. Louis, Mo., for use on the grounds of the Louisiana Purchase Exposition. This train load comprises a part of several shipments made by the Studebaker Brothers Manufacturing Company. All kinds of vehicles and harness were included in the order, including wagons, trucks, delivery wagons, street sweepers, street sprinklers, dump carts, hand carts, buggies, opera, 'bus and station wagons, with harness livery complete, and automobiles. In addition to this the Studebaker Company furnished complete sets of harness for all styles of horse vehicles that will be used on the grounds.

The Studebaker people are to be congratulated upon their success in landing this large order for so notable a work. It should be a matter of no little pride that the Studebaker quality, style and general excellence outweighed other considerations with the Exposition authorities, and thus influenced them in placing the entire order for vehicles and harness with this well-known firm.

TRAINLOAD OF VEHICLES SHIPPED TO ST. LOUIS FOR USE ON GROUNDS

Visitors to the Exposition will find the Studebaker very much in evidence on the grounds, but they will also find it worth while to look up the Studebaker Exhibit in the Transportation Building, east center. It is understood that this will be the most extensive and complete exhibit of vehicles seen at a World's Fair.

Street Paving

MILLIONS have been expended on Cincinnati's streets. Additional millions will have to go into them. How important it is to have these vast sums honestly and wisely expended!

Cincinnati wants and should have as good streets as any city in the country. Money spent for such purposes, if honestly and wisely expended, could be devoted to no better public use.

Are the taxpayers of this city getting their money's worth in the street improvements that are now being made? Has good judgment been exercised in ordering the particular kind of paving that is being laid? These are questions well worth careful consideration.

Engineers have been experimenting for years for the purpose of ascertaining what kind of paving is best suited for the improvement of city streets. It is not so very long ago that the dirt or macadam street prevailed, and even at the present time many of our city's streets are macadamized roads. Driveways thus improved are by no means satisfactory, and if kept in good condition and clean—which is seldom the case—the cost is by no means inconsiderable—probably greater in the long run than other methods of improvement requiring a much larger original outlay.

There are many objections to the macadamized street. When dry it is dusty and the dust is a serious annoyance, not only to those making use of the street, but to those whose stores or dwellings abut thereon. Rain also brings its annoyances; although it lays the dust, it converts it into a sticky mass, and not unfrequently washes so much of the road away that hundreds of dollars are required to put it in condition again.

The macadam street was succeeded in the heart of the city by cobble-stones, but the rattle and rumble of vehicles over them and the excessive wear and tear on carriages caused them to be discarded.

The cobble-stone was followed by the so-called Belgian block, and much of this is still in use, but it is by no means satisfactory. It is hard on horses as well as on vehicles.

Brick paving was then introduced, but it has not been successful. It crumbles under traffic, and in wet and frosty weather becomes slippery and dangerous to drive on. It is true of bricks, as of all jointed pavements, that it is impossible to maintain them in a smooth and perfect condition.

Following the admitted failure of brick paving came Trinidad street asphalt. Miles of it were laid in cities all over the country before its merits or demerits were known. The asphalt street presents a most attractive appearance when first laid, but it cracks and disintegrates in a short time, and is in constant need of repairs. Since its introduction, twenty-five years ago, all manner of experiments have been made to overcome its defects, but evidently without success. Repairs are still necessary all the time. Another very serious objection to the asphalt street is that it is dangerously slippery. Then again, asphalt paving is controlled by a company or trust that has a practical monopoly of the business and that is charging very much more for that kind of pavement than it should reasonably cost. This was clearly shown recently when repairs on Plum street were made by another company at less than one-third the price per square yard that the city has been paying for such repairs to contractors representing the asphalt combine.

A few weeks ago we called attention to a comparatively new kind of paving known as "Warren's Bitulithic Waterproof Pavement," which we learned was being adopted by many municipalities in preference to asphalt paving. If all that was stated as to the merits of the "Bitulithic" pavement in the report that we published is true, there can be no question as to its superiority over any kind of paving now in use. The report we printed was one made by a committee appointed by so many well-known driving associations, automobile and bicycle clubs in New York City, that we had none then and have not now any reason to doubt its being an impartial statement of the merits of "Bitulithic" paving. In view of the importance of the question, however, to the people of this city, we have been collecting further information on the subject. If what is claimed for this new pavement can be substantiated, it should be adopted by Cincinnati at once, and all idea of making further street improvements with asphalt should be abandoned.

We have been advised that since the early days of asphalt paving in this country the Warrens have taken an active part in its development and personally superintended the laying of one-third of the asphalt paving in this counutry. During their long connection with the asphalt industry they were constantly endeavoring to improve that paving, but years of incessant study convinced them that the theory of constructing the old style asphalt pavement is practically wrong, as it has no inherent stability. The wearing surface of an asphalt pavement is made of particles of sand bound together by asphalt, the asphalt acting merely as a cement, the sand, which has no inherent stability, being depended upon to sustain the weight of traffic.

The Warrens thereupon set out to construct a practical road that would not only withstand the heaviest traffic, but would also have inherent stability, be smooth, without being slippery, waterproof, and, therefore, sanitary; practically noiseless and free from dust and mud. With this end in view, stone was selected as the basis for the pavement which has since become known under the name "Bitulithic." The foundation of the "Bitulithic" pavement is composed of broken

stone from two to three inches in diameter. This is laid on a thoroughly rolled sub-grade, the stone being compacted under 15-ton rollers. This foundation of coarse stone is bound together with a hot bitumen, which prepares it to receive the wearing surface. The composition of the "Bitulithic" wearing surface is made up of varying sizes of stone so accurately and scientifically proportioned that the voids between the larger ones are so completely filled by the smaller ones that the result is a density equal almost to solid stone. These particles, which vary in size from one and one-half inches to fine powder, are completely coated with bitumen in a mechanical mixer, and while hot are hauled to the street and compacted under heavy road rollers until further compression is impossible. The surface is then flushed with a waterproof flush coat and stone chips, also hot, are rolled in, and the pavement is immediately ready for travel.

The "Bitulithic" pavement has been laid in sixty-five cities in the United States and Canada, and it is claimed that it has given entire satisfaction wherever introduced.

We expect to continue our investigations as to "Bitulithic" paving, and should be pleased to be advised by our readers as to anything they may know either for or against this new kind of pavement. If it is good, this city ought to have it; if it is not what it is claimed to be, Cincinnati does not want it.—*The Citizens' Bulletin.*

Slag as a Paving Material

The use of slag as a paving material is neither new nor experimental. Its use extends over three hundred years in Europe, one hundred and fifty years in Pennsylvania and nearly forty years in Chicago. It is recognized by the engineering profession as equal to stone in concrete, and superior to stone when used without cement for street paving, as a foundation material.

Slag is a by-product in the manufacture of steel and iron. It is a combination of the fluxing stone and the foreign substance that comes from the mines mixed with iron ore. It is melted with the iron and then separated, and, while still in the liquid form, is poured out and loaded into cars with a steam shovel of enormous power, with tool steel teeth to tear it apart. It is grayish in color and resembles stone. Slag is made into Portland cement, brick, mineral wool, and used for concrete, ballast and foundations for street paving.

What is desired in a street foundation is permanency. Material that will stay where you put it and will form a strong and enduring bond. Too much emphasis cannot be put upon what "bond" means in a macadam pavement; it is the holding of all the material composing the pavement immovably in place. A material that cannot be bonded or held in place is worthless for paving. Other things being equal, the value of a foundation material increases directly as its bonding qualities increase. For this reason a Portland cement concrete is better than a natural cement concrete, and likewise slag, which bonds like cement, is better than limestone, which bonds like lime mortar. The slag bond is three times stronger than the limestone bond.

In crushed stone and slag, broken into pieces from two to four inches, there is about 40 per cent. of voids, or open spaces. These are supposed to be taken out by filling and rolling. The more the material rolls down or compresses under the steam roller the less "filler" is required, and vice versa. Slag compresses a little more than stone, but it requires less filler; the one offsets the other. In rolling sand or dirt comes up from the bottom, filling to some extent the lower voids or stone or slag. The contractor puts filler in from the top, and the two meet. It is usual to employ from 22 to 30 per cent. of filler; 30 per cent. is needed in order to properly fill and bond the work. When a property owner pays for a square yard of pavement he pays for all the material and labor incorporated in the work, plus the contractor's profit. This means the cost of filler must be considered, as well as the cost of material to be filled.

The saving by the use of slag instead of limestone for street pavement foundations is as follows:

On 6-inch foundation 1 sq. yd. slag saves.....	$ .09 2/3
On 8-inch foundation 1 sq. yd. slag saves.....	.12 3/9
On 9-inch foundation 1 sq. yd. slag saves.....	.14 1/2
On 12-inch foundation 1 sq. yd. slag saves.....	.19 1/3

The Special Council Committee, Alderman Snow, Chairman, appointed October 19, 1903, to investigate the cost of paving, reports February 24, 1904, on page 2351, that limestone macadam had increased in price in thre years 46 per cent., while in the same time slag macadam has increased but 26 per cent. Also, that a 14½-inch slag macadam costs 4 cents less per square yard than a 12-inch limestone macadam.

Experience shows that a 14½-inch slag macadam is 40 per cent. better and more lasting than a 12-inch limestone macadam.

The information above was furnished us by Mr. Howard H. Gross, 818 Chamber of Commerce Building, Chicago. The company, of which he is the head, has issued a valuable pamphlet, "Why Not Use Slag?" which will be of interest to city engineers and street officials.

Water Purified by Ozone

The purification of water by means of ozone is almost unknown in the United States, although the method has been in use in European cities for many years with perfect success. This fact alone should be sufficient to recommend its use in this country, for the necessity for purifying water supplies in those countries is much greater and more general in its scope than it possibly could be in a country as newly settled as the United States. But the frequent epidemics of typhoid in various cities and towns throughout the country and the constant presence of typhoid in every city of any size and in hundreds of villages afford sufficient evidence to prove the immediate necessity for the adoption of some system of water purification.

It is a fortunate thing that the European method of purifying water is to be introduced into this country. The United Water Improvement Company, Drexel Building, Philadelphia, Pa., has undertaken this task. The Vosmaer System of producing ozone for the purification of water and other purposes is the one which has been adopted by this Company. A complete report on this system, prepared by Mr. J. J. de Kinder, has just been issued, a copy of which can be had by addressing the above Company.

The primary advantages in the use of ozone are summed up as follows:

"First, That it is a clean mechanical arrangement securing a perfect regularity in operation without interruption from ice, conditions of weather, etc.

"Second, That in times of threatening danger by epidemics the quantity of ozone can be increased or the amount of water handled decreased.

"Third, The capacity of the plant can be readily increased as it simply involves a question of multiplying the units of apparatus.

"Fourth, It allows greater freedom in the choice of sources of supply, and, therefore, enters into the question of cost of transportation. These questions can, of course, not be exemplified in figures. The transportation of a water supply from long distances may involve millions. Again, the cost of the installation depends on the quality of the water and size of the installation."

Mr. Vosmaer claims that an ozone plant will require a minimum of attendance and that it is practically self-operative, which means small expense for operation.

Publications Received

—The Fairbanks, Morse & Company (Chicago, Ill.) 1904 catalogue No. 48, Edition C., consists of 88 pages, with handsome cover printed in two colors. The pages are well illustrated and the illustrations as well as the different subjects are carefully indexed, so that the inquirer will find no difficulty in referring to the different types of steam and power-pumping machinery. It has offices in eighteen cities, the first one on the list being Chicago.

—Water works officials and any others interested in water works specialties, yard hydrants, street washers, fire hydrants and cast-iron

goods will find much of value in the cloth-bound catalogue issued by John C. Kupferle, Second and Mound streets, Saint Louis, Mo.

—The National Electric Company, Milwaukee, Wis., tells in an attractive catalogue, No. 61, about the direct current generators and motors it makes. This concern certainly believes in good printing, for this catalogue is a fine specimen of the "art preservative."

—"In the Trenches" is the title of a small booklet sent out by G. M. Gest, general contractor, Union Trust Building, Cincinnati (New York office, Park Row Building). Its illustrations and text tell a convincing story of why wires should be put under ground, and also how to properly do the work.

—J. D. Adams & Co., Indianapolis, Ind., builders of road-making machinery and bridges, have issued catalogue No. 5, "which supersedes all others." Good roads people everywhere will be profited in reading this catalogue.

—The Austin Manufacturing Company, Chicago, Ill., makers of street sweepers, street sprinklers and earth-handling machinery, have issued an attractive catalogue of 52 pages with a handsome cover. Many of the illustrations show the machinery in actual operation, which give the booklet more than the usual value and interest.

—"Nazareth" Portland Cement, as sold by the Charles Warner Company, Land Title Building, Philadelphia, Pa., has many users. The story of this cement as applied to its many important uses and a few heretofore unpublished tests of this brand is told in a small pamphlet recently issued by the company.

—Catalogue No. 55 of the Murray Iron Works, Burlington, Iowa, tells an interesting story about the work of the "builders of the Corliss engines, simple and compound, belted and direct-connected, air compressors, boilers for all pressures, feed-water heaters, complete power plants, etc. It is fully illustrated and handsomely gotten up.

—The American Steel & Wire Rope Company, Chicago, Ill., with branch offices in New York, Worcester, Denver, San Francisco and elsewhere, has issued a new catalogue of its wire rope and fittings. It contains an adequate description of the method of manufacture and a full and complete price-list.

—The Pittsburg Meter Company, East Pittsburg, Pa., has recently published a leaflet containing valuable suggestions for setting water meters. The company also announces that arrangements have been completed for a comprehensive display of its water and gas meters in the Machinery Building (Block 35, aisle E), at the Louisiana Purchase Exposition, at St. Louis. The company tenders a cordial invitation to make its exhibit your headquarters. Its representative will extend every courtesy possible.

—The Niagara Falls Acetylene Gas Machine Co., Niagara Falls, N. Y., has published a small booklet descriptive of its acetylene gas machinery, and also containing historical data about the development of the industry.

—"Portland Cement Sidewalk Construction"—valuable data obtained from many practical contractors—compiled by P. B. Beery, price 50 cents, has been sent to the MUNICIPAL JOURNAL AND ENGINEER, with the compliments of the Omega Portland Cement Co., Jonesville, Mich.

—"The Perfection of Cement Stone Making" is the title of a small pamphlet recently published by the Stevens Cast Stone Co., 808 Chamber of Commerce, Chicago, Ill.

—The Haywood Wagon Co., Baldwinsville, N. Y., has an attractive illustrated catalogue telling all about its contractors' bottom dumping, end dumping, stone spreading, coal wagons and carts.

—The Hercules cement stone machine is made by the Century Cement Block Machine Co., 20 Canal street, Rochester, N. Y. An illustrated description of this machine and its work is given in a little booklet recently issued by the company.

—City engineers, street superintendents and others will be interested in a brochure dealing with the subject of "Sheet Asphalt Pavements," and sent with the compliments of the American Asphaltum & Rubber Co., 721 Woman's Temple, Chicago. It only contains a few pages, but these include a large amount of valuable information.

Items of Interest to the Trade

—It is announced that the Louisiana Purchase Exposition will use the well-known "Pick-up" hand street sweeper in cleansing the floors of the buildings and of the streets within the fair grounds. This deservedly popular sweeper has been fully described in previous issues of the MUNICIPAL JOURNAL AND ENGINEER. A booklet which will tell all about it will be sent to any address. Apply to Sanitary Street Sweeping Co., 504 Virginia avenue, S. E., Washington, D. C.

—The Winget Concrete Machine Co., Columbus, O., announces that it is constructing a building with its concrete blocks on the World's Fair Grounds. All visitors are invited to visit the building and see one of these machines in operation. The building is located just east of the Press Building and the Wireless Telegraph Steel Tower, and north of the Liberal Arts Building.

—The Ewing-Merkle Electric Co., St. Louis, Mo., has issued an illuminated and indexed map of the World's Fair Grounds and "The Pike," which is marvellous in its completeness and convenience. It measures 8 x 12 inches in size and folds up into a neat envelope, so that it can be easily carried in the vest pocket. It shows the location of every building and every feature on the grounds, and the index enables one to find instantly the location sought. A copy will be given free to any one who applies for it either personally or by mail.

Good Roads System Starts in New Hampshire

A DETAILED map of the State of New Hampshire has been completed under the direction of State Engineer Dean at Concord. All the existing maps of the State or local district were consulted so that the new map would contain all the best information about the roads of the State. The special thing sought was the location of the main highways of the State such as are used by more than local travel. Later, a thorough inspection of all the roads will be made to determine whether what appear to be main thoroughfares on the outline maps are in reality the most direct routes, and, when there are two or more roads between two points, which of them is really best for permanent improvement. The act creating his department required that this work be done and gave to the local authorities the privilege of consulting with the State Engineer regarding improvements, but Engineer Dean wishes to go farther and get into closer touch with local men by holding meetings at different points so that an exchange of views may be had by all interested.

Cosmopolitan New York

ONE of the pleasures reserved for New York City is that of granting to those who enter her gates the unique privilege of shaking hands with the Old World.

Representatives of so many nations are resident there, and in such great numbers that "City of Nations" would seem quite as appropriate a name for the metropolis of the New World as Greater New York. Humans of every racial peculiarity and every shade of skin are congregated there. Throughout the length and breadth of the city is heard the speech of many tongues, and customs of various climes unite harmoniously with those of the big island city of the Atlantic Coast.

Mingling in the tumultuous stream of city travel, Americans and foreigners touch elbows repeatedly. Germans and French meet without the least animosity; Russians and Chinese have no disputes over territorial rights; tense-featured Greeks and languorous-eyed Armenians trundle their pushcarts side by side, as peaceably as brothers; Indians of the East and West amuse the insatiable, show-hungry public by their mysterious juggling and aboriginal joggling. Fair-skinned Swedes or Norwegians, and brilliantly dark Spaniards pursue the same vocations, or take their recreations in the same manner.—*From "A City of Nations," by Emma Archer Osborne, in Four-Track News for June.*

CONTRACT NEWS FOR THE MONTH

Including Paving, Sewerage, Water Supply, Lighting, Public Buildings, Sewage and Garbage Disposal, Fire Supplies, Contracts Awarded

N. B.—All news of proposed work sent us by city officials is incorporated in our Weekly Advance News Service and appears subsequently in this "Contract News for the Month" if the date of the reception of bids be sufficiently late to warrant placing the item here.

City officials and others are urged to send us all news of contemplated improvements for use in our Weekly Bulletins which are mailed to those interested.

PAVING, PAVING MATERIALS AND MACHINERY

Albany, N. Y.—Property owners on So. Pearl street asked new pavement. Alderman Coplon.

Atlanta, Ga.—Will probably pave several streets with asphalt block. Alderman W. M. Terry.

Baltimore, Md.—Estimated cost of grading about nine and one-half miles of streets in burned district placed at $218,500. Park Terrace may be paved.

Belle Plaine, Ia.—Plans have been made for street grading.

Binghamton, N. Y.—Plans prepared for paving Clinton street with brick. Good roads bill for this county signed by Governor Odell.

Birmingham, Ala.—It was stated that bids were to be received for grading, curbing and macadamizing on Beech street. Will pave Highland avenue and other streets.

Brooklyn, N. Y.—Douglas street will be graded at a cost of $30,300.

Brownstown, Ind.—Hamilton township voted to build twenty-two miles of road, at a cost of $30,550.

Camden, N. J.—Will asphalt Division street and repave several other streets.

Canton, O.—Plans have been prepared for paving and curbing several streets. City Engineer F. E. Myers.

Charleston, S. C.—Plans prepared for paving Wentforth, Philip, Line and Columbus streets and Ashley avenue.

Chattanooga, Tenn.—Poplar street paving agitated.

Cheviot, O.—Will improve Harrison avenue.

Cleveland, O.—Fullerton street will be paved.

Collingswood, N. J.—Will build seven miles of macadam paving. R. T. Collins, Mayor.

Crookston, Minn.—Seven streets may be graded and macadamized.

Dallas, Tex.—Council favored $50,000 bond issue for improvements in Oak Cliff.

Dowagiac, Mich.—It is said that two streets will be paved at a cost of $50,000.

Frankfort Ind.—Plans being made for brick pavement on Main street.

Freeport, Ill.—Ordinance provided for $23,580 for streets, etc.

Fulton, N. Y.—Cost of macadamizing So. 3d and 4th streets placed at $40,000. Board Public Works.

Galveston, Tex.—May pave portions of 21st, 20th and 24th streets.

Grand Rapids, Mich.—Will probably pave First avenue with asphalt or brick on concrete. Estimated cost of paving Wealthy avenue bridge with creosote block placed at $6,000. Cy. Clk. J. L. Boer.

Great Falls, Mont.—Considering material for paving 20,000 square yards on Central avenue.

Hamilton, O.—$90,000 bonds will be issued for paving.

Harrisburg, Pa.—Front street will probably be paved.

Haverhill, Mass.—$10,000 appropriation secured for macadamizing River street by Representative Wm. L. Adams.

Hinsdale, Ill.—Will construct macadam paving. Contract to be let June 15. Village Clerk Wm. Duncan.

Hoboken, N. J.—Will pave a portion of Ferry street.

Houston, Tex.—Fourth Ward Improvement League will petition county to aid in paving San Felipe street with brick. H. S. Fox.

Indianapolis, Ind.—Will probably asphalt a portion of W. Washington street. City Engineer Jeup. Were considering buying two street scrapers. Board Public Works.

Jersey City, N. J.—Will improve Pavonia avenue.

Joplin, Mo.—A vote is to be taken on bond issue of $194,000 for improvements.

Kearny, N. J.—Resolution provides for macadamizing Forest avenue.

Lexington, N. C.—Will vote June 7 on street improvement bonds. The Mayor.

Little Falls, Minn.—We are advised that this city expects to macadamize six or eight blocks of streets during the summer. Fred Cary, City Clerk.

Louisville, Ky.—Market street will be asphalted at a cost of $60,000. Mayor Grainger.

Lowell, Mass.—Will probably extend several streets.

McKees Rocks, Pa.—It is stated that all streets will be paved with brick.

Mansfield, O.—It is proposed to pave three streets with brick. City Engineer L. A. Kuth.

Meadeville, Pa.—Resolution provides for paving Chestnut street with brick at cost of $7,000.

Minneapolis, Minn.—Resolutions asked for paving 7th street with six inches of slate, 15th avenue with sandstone blocks, and the curbing of six streets with artificial stone. Alderman Holmes.

Newark, O.—Will pave Wood avenue and Locust street.

New Orleans, La.—Plans ready for paving on eight streets. City Engineer.

New Rochelle, N. Y.—Will probably issue bonds for street improvements.

Norfolk, Va.—May appropriate $18,000 for the improvement of Granley street.

North Eastern, Mass.—$2,000 appropriated for concrete walks. J. A. Burns.

Oakland, Cal.—Plans ready for improving two streets.

Paducah, Ky.—Will issue $150,000 bonds for improving streets.

Paterson, N. J.—Estimated cost of paving 7,500 sq. yds. of road with asphalt and 2,700 yards of gutter with brick, placed at $28,500.

Philadelphia, Pa.—Will spend $2,200,000 for paving and street improvements.

Portland, Ore.—Will spend $380,000 during the summer for street improvements, including macadam and other pavements.

Pratt City, Ala.—Will open several streets. The Mayor.

Reading, Pa.—Will probably extend several streets and pave some. City Clerk.

Rochester, N. Y.—Streets adjoining Market street are to be paved. $1,520,000 improvement bonds will be issued. Bids were to be asked for brick on Sellinger street. Proposed to pave Portland avenue, Wilkin, Trinidad, Augustin, Hobart, Augusta, etc., streets, and lay cement walks. City Clerk White.

St. Joseph, Mo.—Proposed to issue $4,000,000 bonds for paving. Clerk Barnes, Board Public Works.

St. Paul, Minn.—Estimated cost of asphalting 8th street placed at $10,975, and Sibley street at $10,520. Will macadamize Arcade avenue and improve others. County Commissioners.

Salt Lake City, Utah.—Cost of macadamizing State street placed at $12,500. Brigham street may be paved.

Sandusky, O.—Cost of paving Campbell street placed at $18,950, and Camp street at $42,000.

San Francisco, Cal.—Stated that Dupont and Valejo streets will be paved, at cost of $10,477. Board Public Works.

San Rafael, Cal.—Will issue $37,000 bonds for road work.

Savannah, Ga.—$90,000 speedway proposed.

Seattle, Wash.—Cost of paving 10th avenue placed at $11,500.

Sidney, N. Y.—Said to have voted $10,000 for brick paving on Main street.

(Continued on page 301.)

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Somerville, Mass.—Mayor Chandler recommended several appropriations for paving, curbing, etc., amounting to $65,500.

Springfield, Mass.—State highway appropriation was about $400,000, and was signed by Governor Bates.

Topeka, Kan.—Cost of paving several streets placed at $36,148. City Engineer.

Trenton, N. J.—Will pave Liberty street, Chestnut avenue, etc. Governor Murphy signed bill appropriating $250,000 for good roads.

Valdosta, Ga.—Will vote on $15,000 bonds issue for paving.

Valparaiso, Chili.—Bids are wanted for $5,000,000 worth of sewer and paving work, July 1. $70,080,000 will be spent by public works department of national government for improvements.

NOTICE TO CONTRACTORS.

Sealed bids will be received by the Board of Mayor and Council, City of Somerset, Ky., up to noon, June 13, 1904, for the construction of about two hundred thousand square feet of concrete paving. Form of proposals, specifications, profile and other information furnished by the City Engineer. Bids not accompanied by a certified check for five thousand dollars will not be considered. The right to reject any and all bids is reserved.

T. R. GRIFFIN, Mayor.

Contracts Awarded

Albany, N. Y.—Contracts for paving and improvements let John Doyle, Ed. F. Dillon, and M. F. Dollard.

Allegheny, Pa.—John Swan, Jr., has contract for paving Ellis avenue with brick, at $5,174.

Bay City, Mich.—Henry Fehrenbach has contract, at 11½ cents per sq. ft., for brick walks in 1904.

Binghamton, N. Y.—Contract let Toledo Constr. Co., Toledo, O., for asphalt pavement repairs, at $1.75 per sq. yd.

Birmingham, Ala.—B. T. Moore & Co. were lowest bidders for walks, at $5,898. Allison & Co. have contract for walks at $1,270.50.

Bridgeport, Conn.—Standard Stone Corporation bid lowest for macadam and telford road, at $4,939.

Chicago, Ill.—Contract let R. T. Conway & Co. for granite paving on two streets at $13,200, and for asphalt on eight streets at $131,500.

Chillicothe, Mo.—Pfaff, Rinwald & Smith have contract for paving Walnut street: 2,760 feet straight curb, Bedford stone, 55 cents; curved curb, $1; 920 cu. yds. concrete, $1.75; rolled gravel, 55 cents; 5,530 sq. yds. brick, $1.04; cement filler, 4 cents; 5,530 sq. yds. asphalt block, $1.74.

Cincinnati, O.—Barber Asphalt Co. has contract for paving Auburn and Armory avenues with asphalt at $1.50. J. W. Sullivan has contract for brick on Peete street at $1.15, and on Seitz street at $1.25. E. J. Gleason has contract for Emery street at $1.20; and W. Flynn for Boyd street at $1.30.

Columbus, O.—Contract for paving Broad street let to Cleveland Trinidad Co. at $24,291 for asphalt block.

Davenport, Ia.—People's Constr. Co. has contract for 4,831 sq. yds. brick paving at $1.69 sq. yd.; and the McCarthy Stone Co. for 10,090 sq. yds. asphalt at $1.84 sq, yd.

Duluth, Minn.—P. McDonnell was only bidder for creosote block paving.

E. Orange, N. J.—George Spottiswood & Co., Orange, have contract for 8,000 tons of broken stone for repairing, at $1.40 per ton.

Frankfort, Ind.—J. J. Holt has contract for Barnett gravel road at $6,200; C. Jarrell and W. Carter have contract for Jenkins road at $12,989.

Freeport, Ill.—G. Maffioli has contract for brick on Oak street at $1.43 sq. yd., and curb at 40 cents.

Ft. Hancock, N. J.—B. M. & J. F. Shanley, Jersey City, bid 90 cents sq. yd. for macadam fifteen feet wide, including curb.

Ft. Wayne, Ind.—Barber Asphalt Co. has contract for 54,083 sq. yds. with Trinidad asphalt at $1.95, with six-inch cement foundation.

Grand Rapids, Mich.—Gildner & Schneider have contract for grading and graveling Sheridan avenue at $7,890. Contract let Kelly-Springfield Road Roller Co., Springfield, O., for a road roller.

Indianapolis, Ind.—J. K. Cooper & Son have contract for brick paving on Missouri street at $2.50 sq, yd.

Ithaca, N. Y.—E. McGreery has contract for macadam on five streets at $30,000.

Jacksonville, Fla.—Contract for 2½ miles of Clearwater road let Jas. Cribbetts at $8,755.

Jersey City, N. J.—John Nolan has contract for paving Batholdi avenue at $7,496; also repairs to macadam pavements.

Kearney, N. J.—David Harper has contract for paving Chestnut street, and Wright & Lindsley contract for paving Stewart avenue.

Kenton, O.—Kelly Bros., of Portsmouth, have contract for Bolen block on N. Detroit street, at $1.44 sq. yd.

La Crosse, Wis.—Northwestern Constr. Co. has contract for paving at $31,454.

Louisville, Ky.—Stated that American Standard Asphalt Co. bid lowest for paving 11,365 sq. yds. of asphalt at from $1.24 to $1.30.

Lynn, Mass.—J. L. Martin, Boston, has contract for 100,000 paving brick.

Menominee, Mich.—John O. Jones, Racine, Wis., has contract for brick on Grand avenue at $23,248.

Michigan City, Ind.—DeWitt & Foster bid lowest for paving six streets.

Middlefield, Conn.—F. T. Lay & Co., Springfield, have contract for macadam and telford road at $5,943.

Milwaukee, Wis.—Western Paving Co. has contract for asphalt repairs at $1.75 sq. yd.

Minneapolis, Minn.—Purington Paving Brick Co., Galesburg, Ill., has contract for creosoted block for 1904.

Mobile, Ala.—Asphalt Paving Co. of Georgia, was lowest bidder for paving. Southern Creosoting Co., Ltd., bid lowest for wood paving.

Montpelier, Ind.—Contract for Monroe street let John Hayes & Son.

New Britain, Conn.—A. C. Sternberg & Son have contract for macadam road.

New Orleans, La.—Sicilian Asphalt Co., New York, has contract for paving on St. Philip street.

Norfolk, Va.—E. G. Bilisol & Co., St. Louis, have contract for asphalt at $2.12 sq. yd.

Oakland, Cal.—E. B. & A. L. Stone have contract for macadamizing 19th avenue.

Ogden, Utah.—J. P. O'Neill has contract for curbing and gutters during 1904, at $15,000.

Opelousa, La.—R. E. Reynolds & Co., Beaumont, Tex., have contract for cement walks at $1.47½ per lin, ft., and for brick walks at $1.07½.

Paris, Ill.—Wolf, Maupin & Curdy, Alton, were awarded contract for brick on three streets.

Plain City, O.—Ulrick & Williams have contract for paving 30,000 sq. yds.

Ridgefield Park, N. J.—Jas. S. Sowerbutt, Paterson, will macadamize eight streets.

Rushville, Ind.—W. M. Caldwell bid lowest for cement walks at $5,000.

Shelbyville, Ill.—Morrisey & Porter, Paris, bid lowest for brick paving on Morgan and Main streets.

Tipton, Ind.—Crail & Daniels have contract for gravel road at $35,000.

Trenton, N. J.—H. Morgan has contract for paving Reservoir street.

Utica, N. Y.—Contract for grading Catherine street let J. W. Johnston at $1,629; and for grading, etc., on other streets, to H. W. Roberts.

Winamac, Ind.—F. M. Glidwell has contract for gravel roads; Lee & Dobbins and Conover, Taber & Co. have contracts for roads also.

WATER SUPPLY

Aberdeen, Miss.—Will vote June 14th on $70,000 bond issue for water works, etc. R. P. Houston, City Clerk.

Ada, Ind. Ter.—Bond issue approved and water works will be installed soon.

Adrian, Ga.—Considering water works.

Albia, Ia.—Considering question of water works system.

Anderson, Mo.—Preliminary surveys reported to have been made for water works. S. W. Squire, Mayor.

Atlantic City, N. J.—Report made on two reservoirs, cost estimated at $415,000. Estimated cost of new pumping station, $75,000.

Avon, S. D.—Plans preparing for water works.

Barton Heights, Va.—City will extend water system and construct reservoir. The Mayor.

Batavia, N. Y.—Bill passed to allow city to put in water meter system.

Bay City, Mich.—City may supply village of Essex with water. Essex may vote bonds for same.

Belding, Mich.—Considering water works.

Bellefontaine, O.—Cy. Engr. S. A. Buchanan writes that about $15,000 worth of water and gas mains will be laid in June and July.

Boyd, Minn.—May vote on $6,000 bond issue for water works.

Bristol, Tenn.—Surveys being made for new water supply.

Broxton, Ga.—Will install water works in business section of city.

Camden, N. J.—Will issue $200,000 water bonds.

Carthage, Mo.—Carthage Water Co. will spend $100,000 for improvements, including filter and main extensions.

Clare, Mich.—Mayor Arthur J. Clare advocates new water system.

Clarksville, Tex.—Turner & McWhortor have asked franchise for water works.

Clinton, S. C.—Considering water works plant.

Cohoes, N. Y.—Were to issue $100,000 bonds for water works improvements, including filtration plant.

Cordele, Ga.—May issue bonds for water main extension. R. L. Wilson, Mayor.

Covington, Ky.—City contemplates water works. C. Z. Williams, Mayor.

Crestline, O.—Considering water works improvements. Estimated cost, $8,000.

Edmonton, N. W. Ter.—Considering water works extensions.

Elberton, Ga.—Bids will be wanted about June 7 for water works. H. S. Jaudon, Dis. Engr., Elberton.

Fairbury, Ill.—Will equip water works system with electric apparatus. E. A. Agard, Mayor.

Ford City, Pa.—Will issue $25,000 water works bonds June 1. F. C. Beecher, Treasurer.

Greenfield, Mass.—Will probably construct reservoir and connecting works in Greenfield fire district at probable cost of $100,000. Will probably install water meters. Frederick E. Wells.

Haddon Heights, N. J.—Borough Council investigating possibility of water works. B. S. Lippincott, Mayor.

Jamestown, N. Y.—Bids June 1 for two boilers for Buffalo street pumping station. Clement B. Jones, Secy. Bd. Water Comrs.

Kingman, Kans.—Reported to have voted an issue of $25,000 water works bonds. S. Liest, Mayor.

Kinston, N. C.— Contemplate obtaining water supply from deep wells. L. J. Memborn, Town Clerk.

Lancaster, Pa.—Reported that the proposition of Standard Sanitation Co. to erect filter plant at $200,000 will be recommended to Council by Water Committee.

Lexington, N. C.—Will vote June 7th bond issue for water works. The Mayor.

Lima, O.—Considering additional water supply. J. H. M. Morrison, Dir. Pub. Wks.

Listowel, Ont.—Reported to have voted to issue $10,000 bonds for completing water works.

Lorain, O.—Water works will probably be extended. C. L. Penne, Supt. Water Works.

Macon, Miss.—Plans are being drawn for water works.

Madisonville, Ky.—Will vote on water system at November election.

Millbank, S. D.—Voted to issue $23,000 bonds for water works.

Minneapolis, Minn.—Resolution introduced to lay cast iron pipes of varying sizes in fifteen streets. Alderman Schoonmaker.

Mitchell, S. D.—City is advertising sale of water works bonds. Close to $40,000. Geo. A. Silsby, Mayor.

Monessen, Pa.—Monessen Water Co. is considering 1,000,000 gallon filtration plant. H. D. McCabe, Supt.

Montgomery, Ala.—$200,000 bonds voted for water works extension.

Niagara Falls, N. Y.—City will have municipal water works and filtration plant. Mayor Hancock.

No. Chelmsford, Mass.—Considering water supply. Geo. C. Moore.

Oneida, N. Y.—Voted to construct $25,000 reservoir. Geo. S. Tibbets, City Engineer.

Pasadena, Cal.—Was to vote on water works proposition. Mayor Wm. H. Vedder.

Pittsburg, Pa.—Ordinance will come up for $10,000 for drilling wells. E. M. Bigelow, Dir. Pub. Wks.

Portage la Prairie, Man.—Voted $200,000 water works bonds. F. A. Whittaker, City Secy.

Rankin Station, Pa.—Borough Council considering drilling wells. Borough owns its own pipe system.

Richford, Vt.—Will probably soon build reservoir.

Ridgely, Md.—Will have water works. Irwin T. Salesbury, Town Clerk.

Rochester, N. Y.—Ordinance introduced for water works. Improvements at $250,000.

Rockport, O.—Will issue $75,000 water works bonds.

Russellville, Ark.—Will vote in fall on water works proposition.

Seaside, Ore.—Reported to have voted $10,000 bonds for water works.

Seneca Falls, N. Y.—Discussing the installation of municipal water works system.

Silver Springs, N. Y.—Estimates wanted on new water works.

Spokane, Wash.—City Engr. Gill will prepare plans for three compartment reservoir, capacity of each compartment to be 3,000,000 gal.

Syracuse, N. Y.—Will probably buy 1,000 water meters a year. Com. Pub. Wks. Thompson.

Thomson, Ga.—Will have pipe system of water works for distributing 12,000 to 15,000 gallons daily.

Toledo, O.—May vote on $500,000 bond issue for filter plant.

Trenton, N. J.—About 1,500 ft. of water mains will be laid in Brunswick avenue.

Troy, N. Y.—$450,000 water works extension to be made.

Walhalla, S. C.—Probable cost of water works is $20,000.

White Plains, N. Y.—Bill authorizing White Plains to amend the act providing for water works and create a Board of Water Commissioners was signed by Governor.

Windsor, Ont.—Will purchase meters and lower water mains.

Woburn, Mass.—Will make tests for increase in water supply. Comr. Hayward, Water Dept.

Woodville, Miss.—City will construct water works. Bids until June 7. W. C. Miller, Mayor.

Woonsocket, R. I.—Bond issue of $250,000 provides for water works.

Worcester, Mass.—Estimated cost of extending mains is $12,000. F. McClure, City Engineer.

Contracts Awarded

Alfred, N. Y.—Contract for water works let to Elling Colby & Co., Oswego, N. Y., at $28,000.

Ardsley, N. Y.—W. W. Lindsay & Co., of Philadelphia, Pa., have contract for pumping station.

Auburn, N. Y.—C. W. Conklin has contract for three 150-H. P. boilers for pumping station.

Boulder, Colo.—Hendrie & Bolthoff (of Denver) have contract for iron pipe for water works at $32 per ton.

Cedar Bluff, Neb.—Des Moines Bridge & Iron Works, of Des Moines, Ia., has contract for complete water works at $7,474.

E. Hampton, Mass.—F. A. Champlin, E. Long Meadow, Mass., received contract for test well.

Greeley, Colo.—Bell & Levy, of Pueblo, have contract for outlet to Boulder & Weld Reservoir Co. reservoir at about $10,000.

Harrisburg, Pa.—Contracts for new water mains on 5th street, Grace, Aberdeen and Strawberry alleys let to M. F. Saul.

Mancos, Colo.—O'Brian & Rhoades, Denver, have contract for gravity water works system at $25,000.

Miamisburg, O.—T. C. Brooks & Co., of Jackson, Mich., have contract for water works at $51,019.

Norfolk, Va.—Gleaves & Co. have contract for 30-in. mains at $143,028.

Perth Amboy, N. J.—Holmes & Coogan, Jersey City, have contract for supply main at $10,501.

Pittsburg, Pa.—Snow Steam Pump Co., Buffalo, N. Y., have contract for 1,000,000 gallon pumping engine at $3,133.

Reading, Pa.—U. S. Cast Iron Pipe & Fdy. Co. has contract for c. i. pipe and specials at $5,999.

Schenectady, N. Y.—Jos. H. Clement has contract for water mains at $1,100.

Seattle, Wash.—A. J. Long, of Portland, Ore., has contract for 75-foot water tower at $6,500.

Springfield, O.—Wm. Toad Co., of Youngstown, has contract for 10,000,000 gallon pumping engine at $39,000.

Tishomingo, I. T.—Contract for water works system let to Taylor & Moore, Houston, Tex., for $26,900.

Toronto, Ont.—Canada Fdy. Co. has contract for steel conduit across bay at $14.96 per lin. ft.

Uniontown, Pa.—Fayette Eng. Co. has contract for reservoir and pump house at about $25,000.

Wahpeton, N. D.—C. H. Porritt, of Fargo, has contract for water works at $16,300.

Waterbury, Conn.—Chas. M. Taylor, of Wellesley, Mass., has contract for laying about seven miles pipe for high pressure water service.

Youngstown, O.—Thos. Lightbody received the contract for constructing the filter plant at $92,000.

LIGHTING

Aberdeen, Miss.—Will vote June 14 on electric plant bonds. City Clerk R. P. Houston.

Alton, Ia.—It is reported that this place will have an electric light plant.

Antelope, Ore.—Considering the installation of an electric light plant.

Barre, Vt.—It is reported that a large gas plant is to be established.

Bellefontaine, O.—Will lay about $15,000 worth of gas and water mains in June and July. Cy. Engr. S. A. Buchanan.

Blakely, Ga.—It is stated that the light plant was destroyed by fire.

Brewster, Minn.—Village Board has been considering an electric light plant.

Burlington, Wis.—Municipal electric plant favored by Electric Light Commission.

Caldwell, Tex.—May have $10,000 electric light plant.

Carrollton, Ga.—Considering an electric lighting plant.

Chicago, Ill.—It is stated that $1,947,000 electric light bonds will be issued.

Chisholm, Minn.—Crawley Electric Co., of Duluth, has franchise for lighting city streets. Plant burned, but will be rebuilt.

Clarendon, Tex.—Chase & Co. have contract for light plant.

Clarksville, Ark.—E. F. McConnell has thirty-year franchise for lighting.

Clinton, S. C.—Considering an electric light plant.

Corning, N. Y.—Potter Gas Co. will erect gas pumping station and install 300 h. p. gas pumps.

Coronado, Cal.—May have an electric light plant.

Danville, Pa.—May have a municipal electric light plant.

Duluth, Minn.—Resolutions passed Council in favor of an electric light plant.

Du Quoin, Ill.—Considering electric lighting. Job Cook, Cy. Clk.

Elk Rapids Mich.—May consider a proposition for street lighting.

Elkton, Ky.—E. L. Peck, Guthrie, has five-year franchise for street lighting.

Fairbury, Ill.—Will equip water works with electric apparatus. Mayor E. A. Agard.

Freeburg, Ill.—Voted $5,000 for electric light plant. John Sintzely, Clerk.

Galaconda, Ill.—Will erect an electric light plant. Cy. Clk. Hesselman.

Greensboro, Ga.—Greensboro Lgt. & Pwr. Co. has franchise and will install $15,000 light plant.

Greenwood, Miss.—Will probably issue $123,000 bonds for purchase of electric light plant, etc.

Hamilton, O.—Bond issue needed for repairing city gas plant.

Hoboken, N. J.—Mayor Adolph Lankering recommended a municipal electric light and gas plant.

Janesville, Minn.—May have an electric light plant installed.

Jersey City, N. J.—United Elec. Co. has right to build subways for light and power wires.

Joplin, Mo.—Will vote on enlarging the electric light plant.

Kings Mountain, N. C.—City may erect an electric light plant.

Laurel, Miss.—Considering the installation of a $5,000 electric plant.

Lexington, N. C.—Will vote on June 7 on bonds for an electric light plant.

Lockport, N. Y.—Contemplating the letting of contract for street lighting.

Marion, Ind.—Committee will consider a plan for an electric light plant.

Martinsville, Va.—May have a $70,000 water power electric plant.

Montague, Mich.—Plans have been considered for an electric light plant.

Morehead City, N. C.—Contemplating a city electric light plant. Mayor C. S. Wallace.

Noblesville, Ind.—New bids wanted about June 15 for city lighting contract. A. A. Glenn, City Clerk.

North Easton, Mass.—$3,800 appropriated for street lighting. J. A. Burns.

Ottawa, Ont.—Consumers' Elec. Co. will spend about $30,000 for conduits.

Paducah, Ky.—The electric light plant will be improved. Bd. Public Works.

Palo, Ill.—H. C. Higgins, Dixon, has asked for a gas franchise.

Portland, Ore.—It is stated that the Portland Gas Co. plans to add thirty miles of mains this year.

Reading, Pa.—Will probably vote on bond issue of $200,000 for municipal electric plant.

Royalton, Minn.—Considering a gas plant.

Russellville, Ark.—May have an electric light plant.

St. Joseph, Mo.—Will vote on bond issue for light plant and sewers.

St. Paul, Minn.—Bids are wanted July 5 for electric light fixtures for new State capitol. Bd. State Capitol Commissioners.

San Antonio, Tex.—Franchise for gas, electric light and power plant will be let.

San Francisco, Cal.—Park Commissioners may install a power plant in Golden Gate Park. Estimates for lighting for next fiscal year placed at $20,538. W. R. Hewitt, Chief Dept. of Electricity.

Sebastopol, Cal.—G. W. Swain has electric light and power franchise.

Sherbrooke, Que.—May have an electric light and power plant.

Spencerport, N. Y.—Acetylene gas plant is insufficient and additions must be made.

Springfield, Tenn.—Have sold $35,000 light and water bonds.

Sturgis, Ky.—Will consider propositions for a light plant, which is needed.

Sykesville, Md.—A vote was to have been taken in May on a light plant and water works.

Thompson, Ga.—Will install an electric light plant. Mayor Farmer.

Toledo, O.—Mayor Jones recommended a 2,000 arc light system for city.

Vancouver Barracks, Wash.—Bids are wanted June 9 for an electric light system. F. G. Hodgson, C. Q. M.

Varden, Miss.—Carroll County will erect a $25,000 court house. Board of Supervisors.

Wauwatosa, Wis.—Considering a municipal electric light plant.

West Point, Va.—Will have an electric light plant.

Winchester, Va.—Citizens Gas Co. will make acetylene gas.

Winfield, Kans.—Voted $134,000 for electric light and water plant. City Clerk E. Hartley.

Woodville, Miss.—Bids are wanted Junue 7 for electric light plant. W. C. Miller, Mayor.

Worcester, Mass.—Worcester Gas Light Co. will make many improvements.

Yankton, S. D.—May vote on bonds for electric light improvements.

Contracts Awarded

Hartford, Conn.—Hartford Electric Light Co. has contract for street lighting for five years at $70 per arc per year.

Jacksonville, Fla.—Contract for 500 kw. steam turbine generator, exciter and switch panel granted General Electric Co. at $20,450.

New Orleans, La.—New Orleans Railways Co. has contract for lighting streets at $69 per year for overhead and $85 for underground fed lamps.

Weehawken, N. J.—Monahan Bros. bid lowest for lighting plant at $26,787, $26,454 and $27,159.

PUBLIC BUILDINGS

Adrian, Ga.—Will issue $8,000 bonds for a school. The Mayor.

Anniston, Ala.—Will erect an $8,000 school. The Mayor.

Anoka, Minn.—Voted to issue $30,000 bonds for a school. City Clerk.

Belair, Md.—County Commissioners of Hartford County will erect a $25,000 addition to the courthouse.

Binghamton, N. Y.—Gov. Odell signed bill appropriating $120,000 for an armory here.

Booneville, Miss.—Plans adopted for $35,000 courthouse and $8,000 jail. Board of Supervisors, Prentess County.

Camden, N. J.—Board of Education asked for $125,000 for new schools.

Cleveland, O.—Plans approved for county courthouse to cost about $3,000,000. County Building Committee. Bids are wanted June 6 for schools. School Director Cadwallader.

Columbia, Tenn.—Bids are wanted June 10 for $85,000 courthouse for Maury County. County Commissioners.

Columbus, Ga.—Plans being prepared for $10,000 school. Mayor Chappell.

Cordele, Ga.—Bonds may be issued for remodeling city hall. Mayor Wilson.

Eureka, Cal.—Plans accepted for city hall to cost $75,000.

Farmington, Conn.—Will erect a $10,000 school.

Gadsden, Ala.—Will have a $10,000 Carnegie library. Will erect a $25,000 city hall. The Mayor.

Garfield, Wash.—Will erect a $10,000 school.

Gloversville, N. Y.—Bids wanted June 9 for post office. J. K. Taylor, Treasury Department, Washington, D. C.

Greenfield, Tenn.—Contemplating a $10,000 school. The Mayor.

Little Falls, Minn.—Plans for $10,000 Carnegie library accepted from F. D. Orff, Minneapolis. Bids soon. Fred Cary, city clerk.

McCall, S. C.—Contemplating erection of $10,000 school. The Mayor.

McKeesport, Pa.—Will vote on $125,000 bonds for schools.

Montgomery, Ala.—Will erect a brick school in South Montgomery to cost $22,421. The Mayor.

Newark, N. J.—Have sold $400,000 school bonds.

North Bergen, N. J.—Will vote on $65,000 bonds issue for schools.

Pascagoula, Miss.—May issue $25,000 bonds for school building. The Mayor.

Pickens, S. C.—$10,000 bonds voted for school building. The Mayor.

Pontiac, Mich.—Bids are wanted June 14 for a courthouse to cost about $100,000. County Clerk Geo. A. Brown.

Portland, Me.—Considering new county courthouse. Co. Comrs.

Prosperity, S. C.—Have voted on bonds issue for school. The Mayor.

Roanoke, Va.—Will issue $25,000 school bonds. The Mayor.

Rochester, N. Y.—$150,000 market bonds will be issued.

Rush, N. Y.—$183,000 appropriated for an industrial school.

Senatobia, Miss.—Bids are wanted June 6 for addition to Tate County courthouse. J. A. Wooten, clerk.

Sioux City, Ia.—Bids are wanted June 6 for a school of ten rooms. Secretary Chase, Board of Education.

Somerville, Mass.—Mayor Chandler recommended appropriation of $30,000 for school in sixth ward.

Tacoma, Wash.—It is reported that $200,000 bonds were voted for schools.

(Continued on page 31.)

ENGINEERS, CONTRACTORS, Etc.

ENGAGED IN MUNICIPAL WORK

IOWA ENGINEERING COMPANY
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Construction Superintended

Two Harbors, Minn.—Plans, etc., wanted May 31 for a courthouse. Co. Auditor J. P. Paulson.

Washington, D. C.—Bids are wanted June 20 for post office at Natchetoches, La. J. K. Taylor, Treasury Department.

West New York, N. J.—Considering a $40,000 school. Bd. Educ.

Winona, Miss.—Montgomery County may erect a $50,000 courthouse. County Clerk.

Youngstown, O.—Ordinance provides for $38,000 bonds for jail.

CONTRACTS AWARDED

Beardstown, Ill.—Fernandes & Marks, Jacksonville, have contract for library at $9,950.

Clinton, N. C.—Everett Waddey Co. has contract for courthouse at $18,000.

Convent, La.—M. T. Lewman & Co., Demopolis, Ala., have contract for courthouse at $19,000.

Council Bluffs, Ia.—Winchester & Cullen, Rockford, were low bidders for library at $52,612.

Dayton, O.—J. H. Prinz & Son received contract to build addition to a station house.

Indianapolis, Ind.—J. A. Schumacher & Co. have contract for addition to Shortridge high school at $123,720.

Jonesville, S. C.—Contract for school let Sams & Carter, Columbia.

Leadville, Colo.—Thos. Lovell, Denton, Tex., has contract for post office at $51,798.

Nacogdoches, Tex.—J. M. Innes, Greenville, has contract for school at $20,898.

Salisbury, N. C.—Post office contract awarded T. P. Johnston & Co.

Scottsboro, Ala.—Dobbins & Bynum, Montgomery, were awarded contract for courthouse at $35,000.

FIRE DEPARTMENT SUPPLIES

Absecon, N. J.—Absecon Fire Co. No. 1 will buy equipment and may purchase a chemical engine.

Alpena, S. D.—A volunteer company will be formed. Chief Chas. Miller.

Anoka, Minn.—Bids are wanted June 6 for 750 feet of cotton hose. City Clerk Nicholas Moberg.

Asbury Park, N. J.—West Park citizens will organize volunteer fire company.

Auburn, N. Y.—Will erect a new fire station and equip a company.

Barton Heights, Va.—The fire department will be improved. The Mayor.

Belmont, N. Y.—A truck company may be formed.

Birmingham, Ala.—The press calls for better fire service.

Brainerd, Minn.—More adequate fire protection is needed.

Brunner, Tex.—A volunteer fire company will be organized.

Burlington, Ia.—The Council Fire Committee favors a telephone alarm system and the purchase of 200 feet of hose.

Camden, N. J.—Will issue $200,000 bonds for a duplicate pipe line and additional wells for better fire service. It has been proposed to add two more fire engines to the city's fire force. Fire Committee of Council.

Chambersburg, Pa.—Fire Marshall Brown was to buy 1,000 feet of hose.

Charleston, S. C.—Residents of South Charleston want better fire protection.

Chester, Pa.—Press calls for automatic fire alarm system.

Clarksville, Tenn.—A combination hose and chemical wagon was to have been purchased.

Cleveland, O.—Will erect an engine house on Doan street.

Clinton, Ind.—A fire company will be formed. Henry Mills

Dallas, Tex.—Two stations for Oak Cliff have been favored by the Council.

Duquesne, Pa.—The Borough Council will equip three volunteer companies.

Evansville, Ill.—Better fire protection wanted by the manufacturers. Mayor Covert.

Gilman, Ill.—A fire company has been organized. Dr. Whitsitt, chief.

(Continued on page 32.)

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CITIES, TOWNS AND PUBLIC INSTITUTIONS
WRITE FOR BOOKLETS

Glenwood, Mich.—Proposed fire protection bonds were vetoed

Goshen, Ind.—Fire protection is needed in the western part of town.

Hillyard, Wash.—Better fire protection may soon be provided.

Jackson, La.—Will establish a paid department for which bonds were issued.

Java, S. D.—Will consider fire protection. Town Board.

Joplin, Mo.—If bonds are voted a new central fire station will be erected.

Kansas City, Mo.—Bids were to have been asked for five headquarters and two engine houses. Chief Trickett.

Kirkwood, Mo.—A volunteer company has been formed. Alex. Kessler.

Lansing, Mich.—Insurance men want a paid department.

Lockport, N. Y.—Will install hose wagons. Fire Commissioners.

McKeesport, Pa.—Chief Hardy wants protection for Eleventh Ward.

Madison, Wis.—Will increase size of department. Chief Bernard.

Marinette, Wis.—Chief Hodgins recommended 1,200 feet of fire hose.

Marquette, Mich.—May soon install a steamer. Chief Maney.

Moline, Ill.—City may buy a fire-boat.

Montrose, S. D.—Volunteer department urged by press and citizens.

Mountain Iron, Minn.—Volunteer department formed. Chief. Jas. Courtney.

Muskegon, Mich.—More hose recommended by Fire Committee of Council.

Newburg, N. Y.—Council expected to vote $12,000 for fire building.

Niagara Falls, N. Y.—Will erect a $12,000 fire house and buy an engine.

North Easton, Mass.—$6,000 appropriated for a fire station and $400 for fire alarm and apparatus. Jas. A. Burns.

Painesville, O.—Hose in bad shape, 1,000 feet needed. Chief Morgan.

Palatka, Fla.—May erect a fire station. The Mayor.

Passaic, N. J.—Will probably buy new fire hose.

Pawtucket, R. I.—$25,000 appropriated for a fire station.

Philadelphia, Pa.—Will spend $200,000 on fire houses. Mayor Weaver.

Pryor Creek, Ark.—Volunteer company organized. Capt. D. M. Fox.

Racine, Wis.—Chief Jas. Cape asked for a new truck.

Richmond, Va.—Plans prepared for fire engine and truck house for W. Broad street. The Mayor.

Rochester, N. Y.—Sites approved for fire and police stations.

Rock Island, Ill.—Another fire station wanted by manufacturers.

San Mateo, Cal.—Will purchase a $3,000 chemical engine.

Scranton, Pa.—Ordinance provided for $100,000 bonds for fire headquarters and for fire alarm system.

Sioux City, Ia.—City Electrician has plans for better alarm system.

Sour Lake, Tex.—Will buy equipment.

So. Pittsburg, Tenn.—Volunteer company formed. Chief Weisener.

Toronto, Ont.—Will buy $20,000 worth of fire apparatus. Chief Thompson.

Utica, Mich.—This village nearly destroyed by fire.

Utica, N. Y.—$9,000 will be borrowed for fire fund.

Valley Falls, R. I.—Fire alarm system needed.

Washington, D. C.—Chief W. T. Belt has been arranging for purchase of engines, hose carts and trucks.

Waterbury, Conn.—Will have volunteer fire company.

Westfield, N. J.—Will probably buy chemical engine and ladder truck, hydrants and alarm boxes.

Whitesboro, N. Y.—Will soon act on fire alarm question.

Wilmington, Del.—Fame Fire Co. will buy automobile hose wagon and chemical engine.

Contracts Awarded

Bangor, Me.—Contracts for hose let T. F. Cassidy & Son, 1,000 feet; and C. N. Perkins, Lawrence, Mass., 1,000 feet.

Lynn, Mass.—Edward T. Reynolds has contract for fire station at $25,290.

New York, N. Y.—Contract let Peter Barrett Mfg. Co., Brooklyn, for five hose wagons.

Rochester, N. Y.—American Fire Engine Co. has contract for two Metropolitan engines at $5,500.

San Francisco, Cal.—Gutta Percha Rubber Mfg. Co. has contract for 2,000 feet of 1¼-inch four-ply rubber hose at 17 cents per foot. West Coast Rubber Co. has contract for 3,000 feet of one-inch four-ply rubber hose at 12 cents per foot.

Tacoma, W.—William Gardner & Co. has contract for 1,000 feet hose at 90 cents per foot.

SEWERS

Aberdeen, Miss.—Will vote on June 14 on sewer system bonds. City Clerk R. P. Houston.

Belle Plaine, Ia.—Plans to be made for sewer system.

Birmingham, Ala.—Will construct several sewers.

Blissfield, Mich.—Plans to be drawn for a sewer system.

Brooklyn, N. Y.—New sewer for 41st street, to cost $19,000, authorized.

Cambridge, Mass.—Council ordered $112,000 bonds for sewers.

Canastota, N. Y.—Considering a sewer system. G. R. Tibbetts, Engineer.

Canton, O.—Plans prepared for sanitary district No. 2, etc., to cost $134,755. City Engineer Meyers.

Chicago, Ill.—Western avenue sewer will be enlarged from 9 to 12 feet.

Collingswood, N. J.—About four miles of sewers will be constructed. Mayor R. T. Collins.

Cordele, Ga.—May issue bonds for sewer extensions. Mayor A. L. Wilson.

Danville, Ill.—Ordinance provides for storm water sewer in 7th ward, to cost $25,000.

Garden City, N. Y.—It is reported that a five-mile sewer system will be constructed, together with disposal plant.

Grand Rapids, Mich.—The south end may have a sewer system to cost about $85,000. Board of Aldermen.

Hammond, Ill.—Will install a sewer system.

Hamilton, O.—City Engineer C. A. Dillon has submitted estimates for a sewer system. East avenue may be sewered.

Haverford, Pa.—Lower Merion Commissioners will issue $140,000 sewer bonds.

Haverhill, Mass.—Estimated cost of sewer improvements in 6th ward placed at $60,000. City Clerk R. R. Evans.

Havre de Grace, Md.—Voted to issue $20,000 bonds for sewer system.

Iola, Kans.—Petition called for sewers in district "D," including septic tank and about 10,000 feet of mains. Talking of a sewage pumping plant. City Engineer L. P. Stover.

Jersey City, N. J.—May spend $70,000 on a sewer in Newark avenue.

Johnstown, N. Y.—Voted $31,000 bonds for trunk sewer. City Engineer Campbell.

Joplin, Mo.—Were to vote on an issue of $194,000 bonds for improvements.

Lorain, O.—Sewers will be constructed on Oak and Foundry streets.

Louisville, Ky.—Will vote on $3,500,000 bond issue for sewers.

Minneapolis, Minn.—Resolution called for sewers in four streets.

Montgomery, Ala.—$50,000 bonds voted for extension of sanitary sewers.

Newport, Me.—$3,000 voted for a sewer.

New Wilmington, Pa.—Plans reported under way for a sewer system.

Oakland, Cal.—Will construct a number of sewers. City Clerk Thompson.

Ottawa, Ont.—Plans preparing for system of relief sewers to cost $20,000.

Pekin, Ill.—Plans reported ready for sewer system to cost about $194,764.

Philadelphia, Pa.—Will construct $1,000,000 worth of sewers.

Reading, Pa.—City Engineer E. H. Beard will prepare plans for sewers in various streets.

Revere, Mass.—$6,000 appropriated for sewers.

Ridley Park, Pa.—$6,000 appropriated for city sewer system.

(Continued on page 34.)

PROPOSALS.

Highway Improvement.

NOTICE TO CONTRACTORS.

STATE OF NEW YORK,
OFFICE OF THE STATE ENGINEER,
ALBANY, N. Y.

Pursuant to Chapter 115 of the Laws of 1898, sealed proposals will be received by the State Engineer, at his office in the State Hall, at Albany, N. Y., on Monday, the 6th day of June, 1904, at 12 o'clock noon, for the improvement of the public highways as follows:

No. 158. Northampton, Montgomery County, 7/10 mile.
No. 159. Middletown—Slate Hill, Orange County, 3 49/100 miles.
No. 160. Slate Hill—Unionville, Orange County, 8 45/100 miles.
No. 161 Newburg—Shawangunk, Orange County, 8 61/100 miles.
No. 162. Oneonta, Otsego County, 1 39/100 miles.
No. 163. Broadway—Fort Hunter, Schenectady County, 1 71/100 miles.
No. 164. Downsville, Delaware County, 4 2/10 miles.
No. 165. Little Ridge, Sec. 2, Monroe County, 2 062/1000 miles.
No. 166. Penfield, Sec. 1, Monroe County, 3 635/1000 miles.
No. 167. Penfield, Sec. 2, Monroe County, 5 313/1000 miles.
No. 168. Dugway, Sec. 1, Monroe County, 3 323/1000 miles.
No. 169. Dugway, Sec. 2, Monroe County, 4 019/1000 miles.
No. 170. Dugway, Sec. 3, Monroe County, 2 88/100 miles.
No. 171. Lake, Sec. 1, Monroe County, 2 miles.
No. 172. Portland Avenue, Sec. 1, Monroe County, 703/1000 mile.
No. 173. Hudson Avenue, Sec. 2, Monroe County, 995/1000 mile.
No. 174. Endicott, Broome County, 2 17/100 miles.
No. 175. Chenango Towpath, Broome County, 1 836/1000 miles.
No. 176. Albany—Schenectady, Albany County, 2 31/100 miles.
No. 177. Schoharie, Secs. 1 and 2, Albany County, 5 miles.
No. 178. Delaware Turnpike, Sec. 3, Albany County, 7 553/1000 miles.
No. 179. Schenectady—Albany, Schenectady County, 2 35/100 miles.
No. 180. East Mohawk Turnpike, Montgomery County, 2 82/100 miles.

Sealed proposals will also be received by the State Engineer at his office in the State Hall, at Albany, N. Y., on Wednesday, the 8th day of June, at 12 o'clock noon, for the improvement of public highways as follows:

No. 181. Watertown—Sacketts Harbor—Henderson, Sec. 1, Jefferson County, 6 04/100 miles.
No. 182. Redwood—Alexandria Bay, Sec. 1, Jefferson County, 2 976/1000 miles.
No. 183. Adams—Henderson, Sec. 1, Jefferson County, 3 03/100 miles.
No. 184. Pierrepont Manor—Ellisburg, Jefferson County, 2 955/1000 miles.
No. 185. State, Jefferson County, 1 mile.
No. 186. Depot, Jefferson County, 1 028/1000 miles.
No. 187. Bristol, Ontario County, 1 72/100 miles.
No. 188. Bristol Valley, Ontario County, 4 83/100 miles.
No. 189. East Side Lake, Sec. 2, Ontario County, 1 286/1000 miles.
No. 190. East Side Lake, Sec. 1, Ontario County, 2 368/1000 miles.
No. 191. Honeoye—Hemlock, Ontario County, 4 549/1000 miles.
No. 192. Beaver Dam, Albany County, 3 54/100 miles.
No. 193. River, Albany County, 8 13/100 miles.
No. 194. Sand Lake—Troy, Rensselaer County, 1 49/100 miles.
No. 195. Wynantskill—W. Sand Lake, Rensselaer County, 4 01/100 miles.
No. 196. East Nassau, Rensselaer County, 3 02/100 miles.
No. 197. Brick Church—Rock Hollow, Rensselaer County, 3 33/100 miles.
No. 198. Delaware Turnpike, Sec. 4, Albany County, 6 607/1000 miles.
No. 199. Delaware Turnpike, Sec. 5, Albany County, 7 862/1000 miles.
No. 200. Old Northern Turnpike, Rensselaer County, 2 75/100 miles.
No. 201. Troy—Poestenkill, Rensselaer County, 3 6/10 miles.
No. 202. Boston—Albany, Rensselaer County, 5 41/100 miles.

Sealed proposals will also be received by the State Engineer at his office in the State Hall, at Albany, N. Y., on Friday, the 10th day of June, 1904, at 12 o'clock noon, for the improvement of public highways as follows:

No. 203. Gorham—Stanley, Ontario County, 2 197/1000 miles.
No. 204. Naples—Atlanta, Ontario County, 585/1000 mile.
No. 205. Naples—Woodville, Ontario County, 3 506/1000 miles.
No. 206. Reeds Corners, Ontario County, 2 669/1000 miles.
No. 207. Geneva—Canandaigua, Ontario County, 6 213/1000 miles.
No. 209. Nineveh, Broome County, 934/1000 mile.
No. 210. Harpersville, Broome County, 85/100 mile.
No. 211. Center Village, Broome County, 571/1000 mile.
No. 212. Ouaquaga, Broome County, 1 10/100 miles.
No. 213. River Road—Windsor, Sec. 2, Broome County, 2 848/1000 miles.
No. 214. River Road—Windsor, Sec. 1, Broome County, 1 868/1000 miles.
No. 215. Dryden, Cortland County, 2 miles.
No. 216. Roxbury, Delaware County, 05/100 mile.
No. 217. Grand Gorge, Delaware County, 1 mile.
No. 218. Greene—Smithville Flats, Chenango County, 4 68/100 miles.
No. 219. Richfield Springs—Cherry Valley, Otsego County, 68/100 mile.
No. 220. Worcester, Otsego County, 98/100 mile.
No. 221. Edmeston, Otsego County, 5/16 mile.
No. 222. Hughsonville, Dutchess County, 3 467/1000 miles.
No. 223. South, Dutchess County, 3 883/1000 miles.
No. 224. Oxford—McDonough, Chenango County, 5 82/100 miles.
No. 225. Guilford, Chenango County, 5 75/100 miles.

Plans and specifications for all of the above work may be seen at the office of the State Engineer. They may also be seen for all roads in the counties of Dutchess, Otsego, Schenectady, Albany, Rensselaer, Delaware, Montgomery and Orange at the office of the Division Engineer of the Eastern Division in the State Hall, Albany, N. Y.; for the counties of Broome, Cortland, Chenango and Jefferson, at the office of the Division Engineer of the Middle Division in the Weighlock, Syracuse, N. Y.; for the counties of Monroe and Ontario, at the office of the Division Engineer of the Western Division, Triangle Building, Rochester, N. Y. Plans and specifications for the roads within each of the following counties may be seen at the office of the County Clerk of the county within which such road is located, respectively: Broome, Cortland, Chenango, Otsego, Schenectady, Rensselaer, Delaware, Montgomery and Jefferson; and for the following roads at the office of the Clerk of the Board of Supervisors of the county within which such road is located respectively: Orange, Dutchess, Albany, Monroe and Ontario.

The attention of bidders is called to the fact that the following roads are in such close proximity to each other that they can be economically managed by the same contractor: Nos. 178, 198, 199; Nos. 194 and 195; Nos. 216 and 217; Nos. 174 and 175; Nos. 181 and 186; Nos. 183, 184 and 185; Nos. 208 and 215; Nos. 209, 210, 211, 212, 213 and 214; Nos. 218, 224 and 225; Nos. 166 and 167; Nos. 168, 169 and 170; Nos. 172 and 173; Nos. 206 and 207; Nos. 204 and 205; Nos. 189 and 190.

Proposals must be made for the completion of each road for a lump sum in accordance with plans and specifications. Each proposal must be accompanied by New York draft or certified check payable at sight to the order of the State Engineer and Surveyor for 5% of the proposal. Such draft or check will be held until the execution of the contract. The successful bidder must give a bond executed by a surety company approved by the State Engineer and in amount not to be less than 50% of the contract price. Monthly payments of 90% will be made on contracts.

Proposals for each road must be presented in a separate sealed envelope endorsed on the outside with the number and name of the road for which the proposal is made.

Specifications, bidding sheets and form of contract may be had on application to the State Engineer or to the Division Engineers above mentioned.

The right is reserved to reject any or all bids.

H. A. VAN ALSTYNE,
State Engineer and Surveyor.

COLLECTION AND DISPOSAL OF GARBAGE.

The committee on garbage disposal will meet at the Mayor's Office, in the City Hall, Elmira, N. Y., on the 15th day of June, 1904, at 3 o'clock p. m., to receive sealed proposals for,—(1) the collection of garbage, (2) the disposal of garbage, (3) the collection and disposal of garbage, in the city of Elmira, for the following terms; three years, five years, seven years and ten years. Contracts for over five years shall include an option to the city to buy the equipment, including plant, at an agreed price. Bids must be made in strict compliance with blank forms of proposal furnished by the city clerk and in accordance with printed specifications on file in the city clerk's office, and must be accompanied by a certified check for Five Hundred Dollars, payable to the city of Elmira, which shall be forfeited to the city if the bidder neglects to enter into a contract within ten days after the acceptance of his bid.

WILLIAM T. COLEMAN,
Chairman.

Rochester, N. Y.—$100,000 sewer bonds will be issued soon.

St. Joseph, Mo.—Will vote on bond issue for sewers and light plant.

San Rafael, Cal.—$7,000 bonds to be issued for sewers.

Scranton, Pa.—Will issue $38,000 bonds for sewers.

Somerville, Mass.—Mayor Chandler recommended $25,000 for sewers.

Trenton, N. J.—Will construct sewers in Walnut and Cook avenues and Hampton and Chambers streets.

Valparaiso, Chile.—Bids are wanted July 1 for $5,000,000 paving and sewer bonds.

Washington, D. C.—Considering a sewer from Poplar street to the naval magazine.

Waterloo, N. Y.—May construct sewer system. John Carlon, Trustee.

Wilmington, Del.—Sewers will be built in Washington and 4th streets.

Woonsocket, R. I.—Bond issue of $100,000 sewer bonds provided for.

Contracts Awarded

Akron, O.—S. C. McGowan has contract for sewer at $7,221.

Allegheny, Pa.—Contracts for sewers awarded as follows: International Constr. Co. at $28,004; M. O'Herron & Co. at $3,731; D. Hunter, $4,133.

Birmingham, Ala.—Black & Laird, Dallas, Tex., have contract for five sections of Valley Creek sewer at $110,186. Montgomery & Co. have contract for pipe sewer at $15,240.

Columbus, Ind.—David Stillinger has contract for brick and pipe sewers at $9,245.

Dayton, O.—R. J. Paul has contract for extending the northwestern sewer in Dayton View.

Findlay, O.—Fred Kleinman received contract for Third Street sewer at $3,700.

Grand Island, Neb.—Grand Island Plumbing Co. has contract for 1,080 feet of 15-inch and 4,730 feet of 8-inch pipe sewers at $5,880.

Galveston, Tex.—Nichols & Heeney have contract for East End sewer.

Guthrie, Ok. Ter.—J. O. Severns has contract for two miles of main sewer at $13.137.

Little Falls, Minn.—Contract let Harrison & Peterson for Belle Prairie drainage ditch at $1,449.

Long Island City, N. Y.—Pease Bros. have contract for Jackson avenue extension at $125,623; Thos. Welch has contract for Bartow street sewer at $126,323.

Louisa, Ky.—W. B. Cox & Co., Pikeville, will build sewer system and water works.

Medfield, Mass.—Contract for 1,339 feet of sewer let Daniel A. Dorey, Somerville, at $1,175.

Mobile, Ala.—J. White Gurley & Co. were low bidders for storm sewers at $75,815.

New Brunswick, N. J.—John Van Demsen has contract for sewer at $3.47 per foot for 3-foot 6-inch brick; 92 cents for 20-inch vitrified pipe; $17 each for manholes; and $6 per cubic yards for concrete.

Oakland, Cal.—M. Murphy has contract for sewer in 66th street. John Geary has contract for sewer in E. 16th street.

Pittsburg, Pa.—Jas. McQuaide has contract for Negley Run sewer extension at $62,800.

Syracuse, N. Y.—Jas. Swift has contract for sewers in two streets at $5,314. C. T. Hookway was low bidder for sewers at $4,135.

Wallingford, Conn.—Thos. F. Maher, New Haven, has contract for new sewer at $5,753.

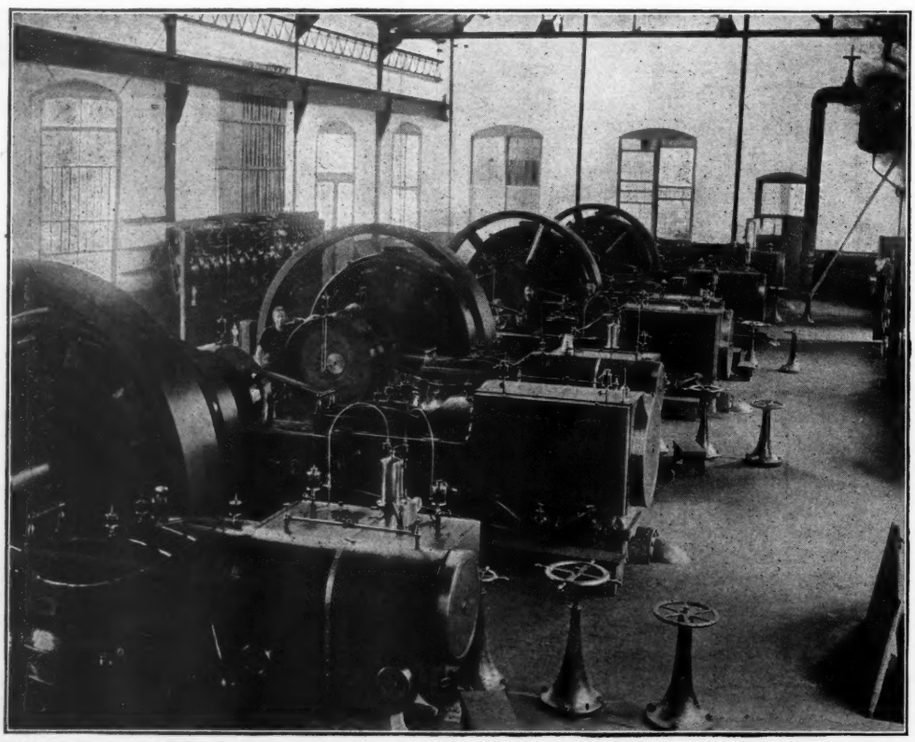
Washington, D. C.—Coffin Valve Co. has contract for sluice gates at pumping station at $7,095.

Wheaton, Ill.—J. H. Green & Co., Appleton, Wis., received contract for sewer system at $45,323. Chas. M. Porter, Chicago, has contract for drainage system at $53,932.

MISCELLANEOUS

Akron, O.—An ordinance provides for the collection of garbage in covered and water-tight wagons.

(Continued on page 35.)



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PHILADELPHIA, PA.

Atlanta, Ga.—The purchase of a park is favored. Councilman C. E. Peters.

Atlanta, Ga.—Decarie Mfg. Co., of Minneapolis, Minn., has contract for a garbage crematory at $31,500.

Baltimore, Md.—It is said that $6,000,000 worth of dock improvements will be made.

Bergen, N. J.—A park will be laid out.

Binghamton, N. Y.—Contract let Studebaker Mfg. Co., South Bend, Ill., for a sprinkling cart.

Birmingham, Ala.—About fifty park benches were to have been purchased. Alderman Cooper.

Bridgeport, Conn.—Contract for garbage disposal let George E. Winton at 50 cents per ton.

Camden, N. J.—Park sites are to be purchased.

Chester, Pa.—Thomas Wilby has contract for 400 feet of 2½-inch hose at 55 cents per foot for street cleaning department.

Chicago, Ill.—City will build two pumping stations in connection with the intercepting sewer system.

Columbus, O.—It is said that about 350 streets are to be cleaned.

Dallas, Tex.—Five street sprinkling carts were to have been purchased.

Dunkirk, N. Y.—Dunkirk Sanitary Reduction Co. has a five-year contract for garbage collection.

Elmira, N. Y.—Considering the question of garbage disposal.

Florence, Ala.—It is reported that the Merchants' Association will sprinkle the streets.

Ft. D. A. Russell, Wyo.—E. B. Hendrie, Denver, Colo., was the lowest bidder for a garbage crematory at $6,950.

Harrison, N. J.—Parks being considered by W. Hudson County Bd. of Trade.

Hoboken, N. J.—Hudson County will issue $500,000 park bonds. Board of Freeholders.

Lacrosse, Wis.—Lake Park may be improved.

Little Falls, Minn.—City Clerk Cary wrote that the contract for sprinkling the streets was let to J. U. Jones at $75 per team per month. ,

London, O.—State Board of Health has approved plans for sewers and sewage disposal plant.

Louisville, Ky.—It is reported that $10,000 may be spent on street sprinkling this summer.

Lowell, Mass.—A municipal concrete plant has been recommended.

Marion, O.—Plans have been prepared for a garbage disposal plant.

Marshalltown, Ia.—Talking about a garbage crematory.

Meridan, Mass.—About $40,000 park bonds may be issued.

Milwaukee, Wis.—It is stated that the Council has been considering means for reducing the cost of garbage collection and disposal.

Minneapolis, Minn.—Revised plans for park bonds have been received.

Mt. Sterling, O.—It is said that a sewage disposal plant will soon be introduced.

New Orleans, La.—Contracts are to be let by Sewerage and Water Board for station for central sewage pumping plant. Parks and playgrounds have been planned by the Commissioner of Parks.

Reading, Pa.—It was reported that bids were to be asked for sewage disposal plant on three different propositions. Board of Public Works.

Rochester, N. Y.—Park Commissioners have $38,534 for improvements. Garbage disposal is being investigated. Mayor Cutler.

Sacramento, Cal.—Plans for a garbage crematory have been submitted.

Saratoga Springs, N. Y.—W. H. Garlos has contract for street sprinkling.

Schenectady, N. Y.—A law has been passed permitting the city to make five-year contract for garbage disposal.

Syracuse, N. Y.—Proposed to appoint commissioners to decide on sewage disposal system. The Mayor.

Toronto, O.—$54,000 septic tank system recommended by City Engineer Rust.

Troy, N. Y.—$150,000 worth of park improvement will be made.

Youngstown, O.—The Board of Public Service was to purchase about 600 feet of hose for street flushing. Belmont Park is to be improved.

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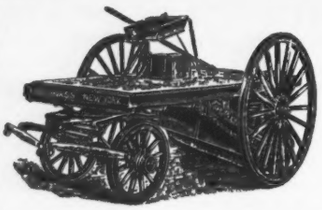

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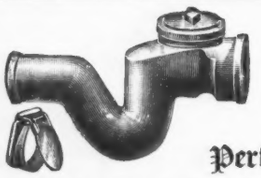

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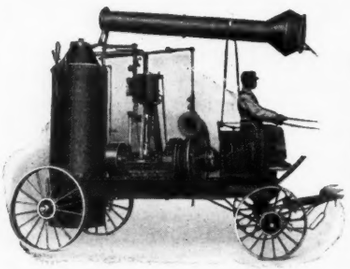

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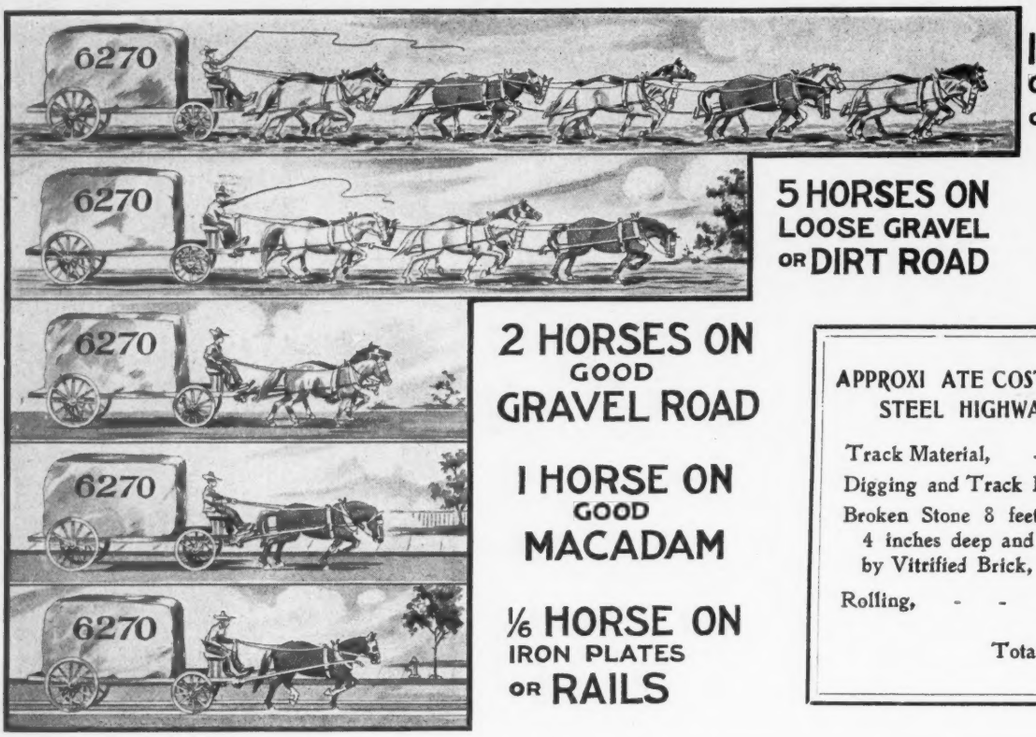

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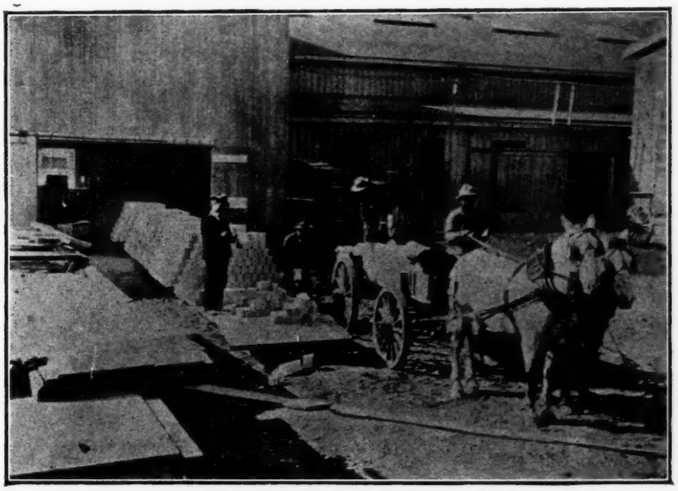

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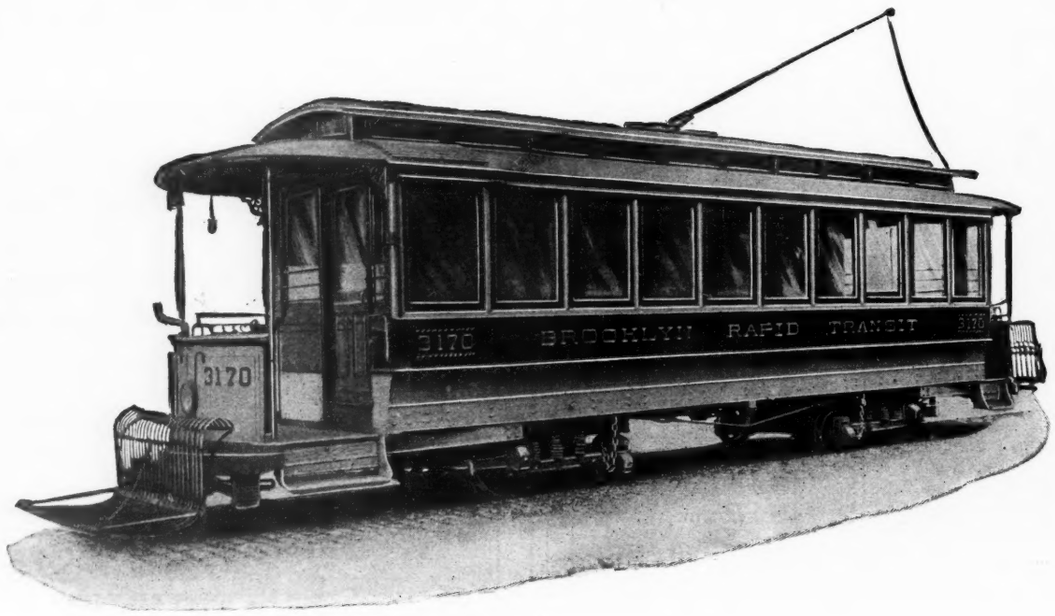

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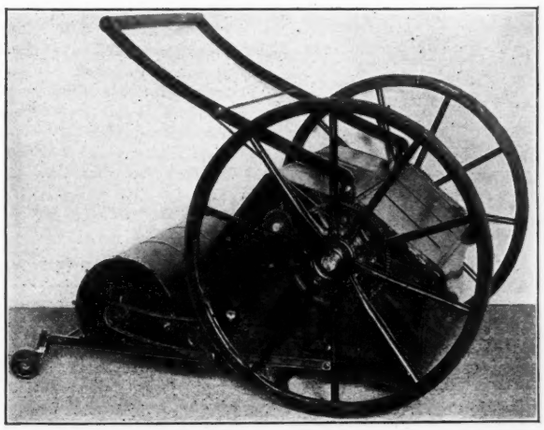

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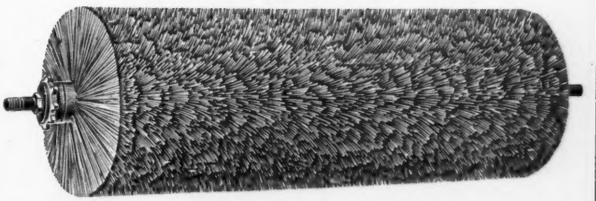

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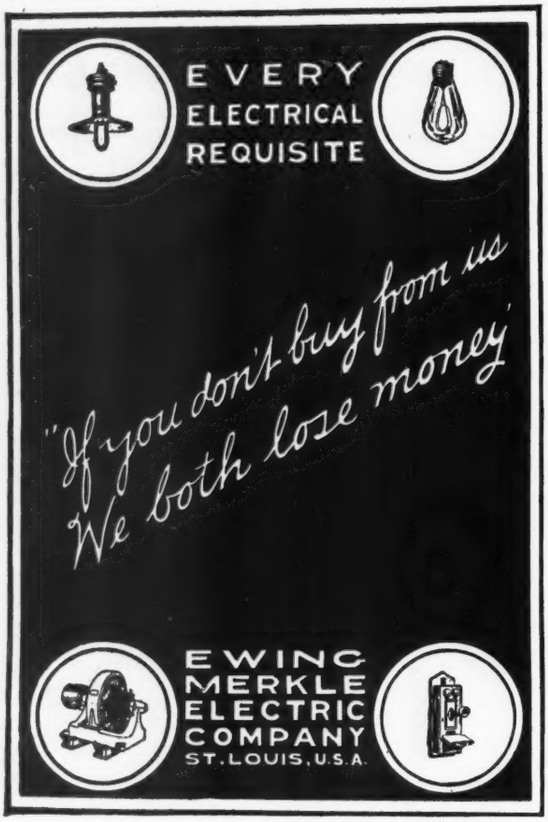

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This means WOOD!

How will You get YOUR Records out?

somewhat quenched, Mr. Hess, the assistance of the firemen, carried the books to safety in the Curtis Memorial library across the street.

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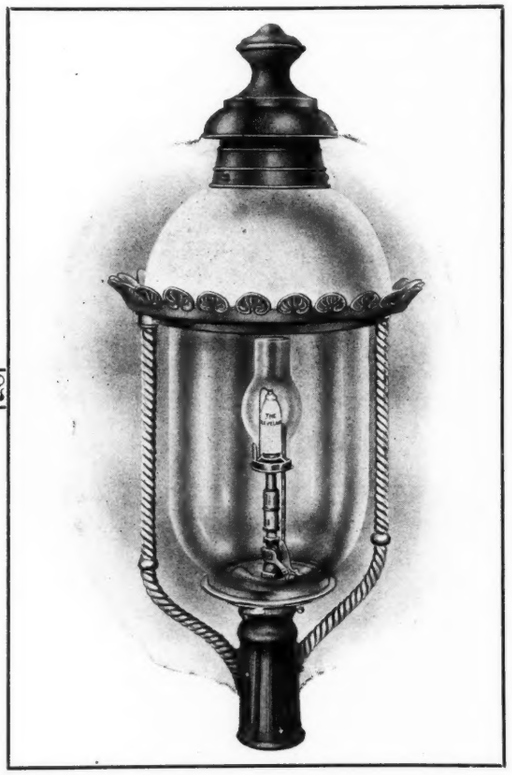

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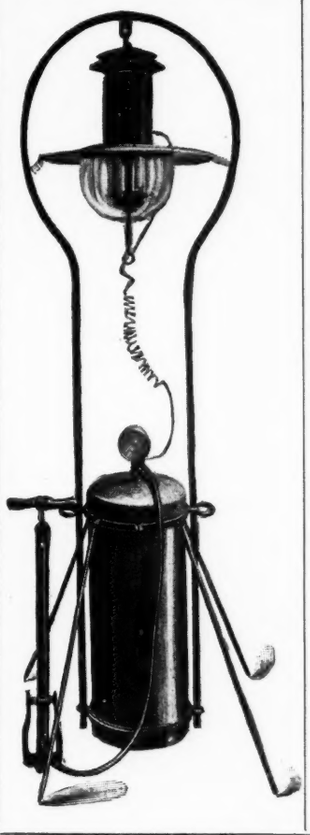

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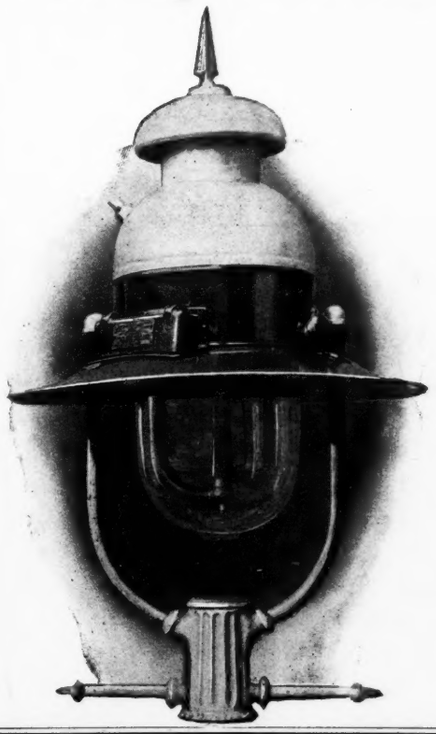

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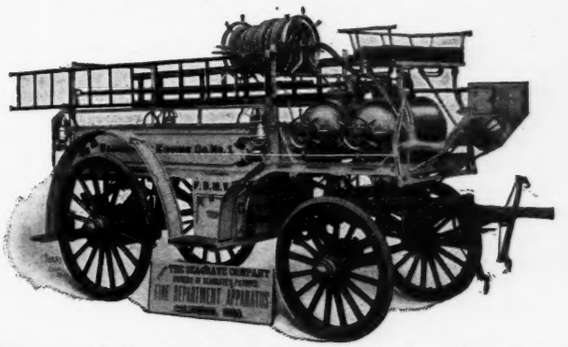

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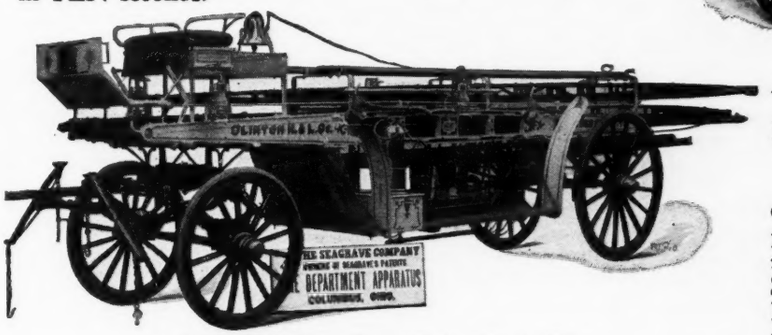

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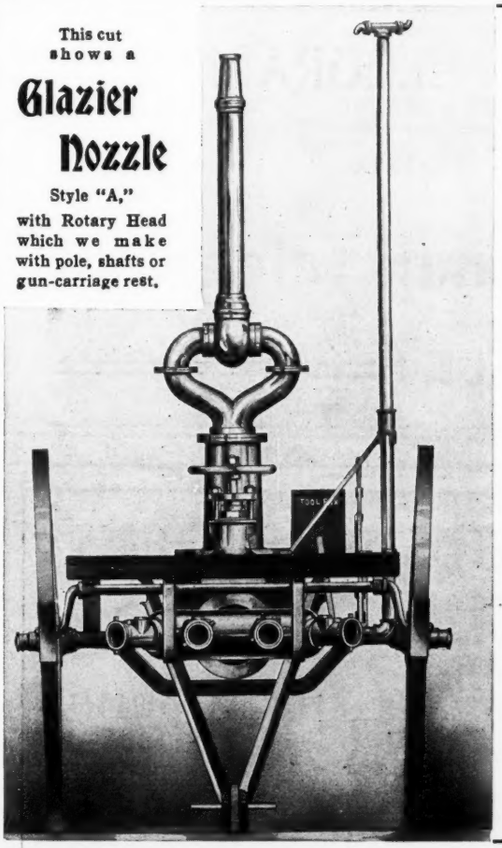

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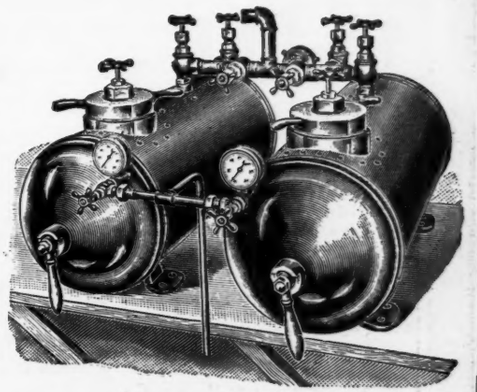

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BUSINESS DIRECTORY

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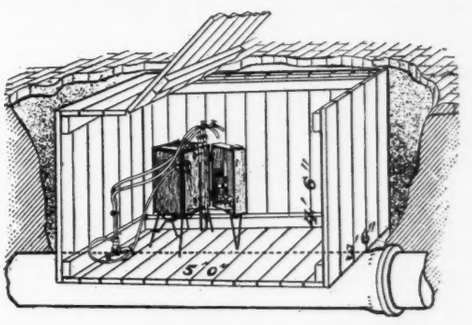

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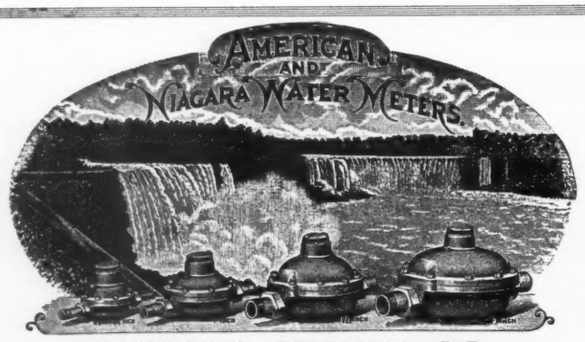

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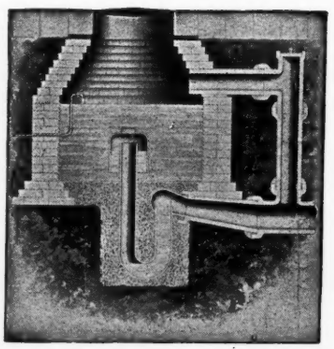

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For Flushing Street Sewers and for Sub-Soil Irrigation.
No Moving Parts. No Valves. No Small Tubes to Clog or Choke. Nothing Whatever to Get Out of Order.

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The Columbus Meter Seal insures absolute protection.
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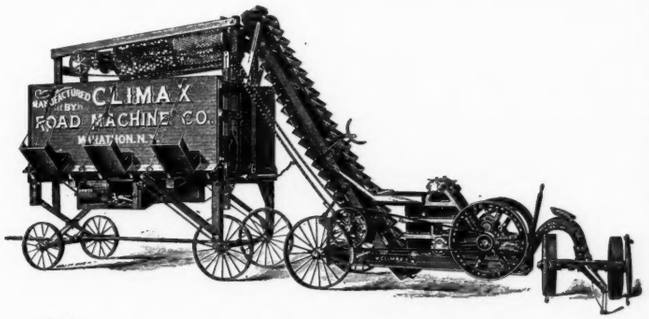

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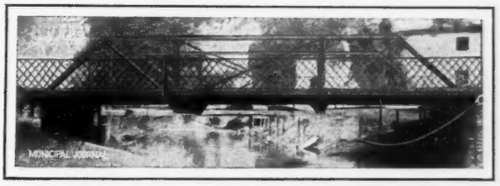

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Highway Bridges and Steel Structural Work.
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A Dump Wagon

THAT CANNOT STALL

TIGHT JOINTS TOO

SEE THAT LOOP!

EASY TO LOAD
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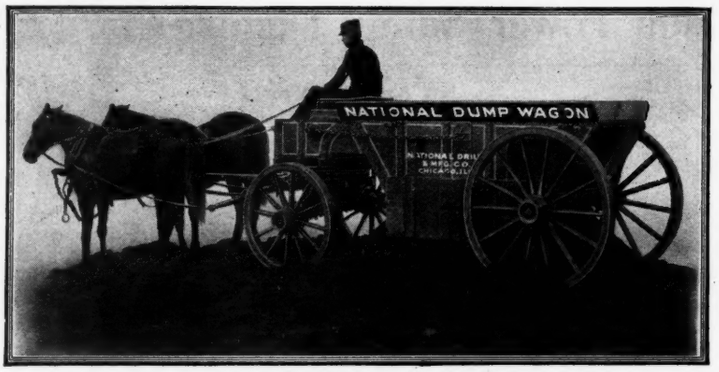

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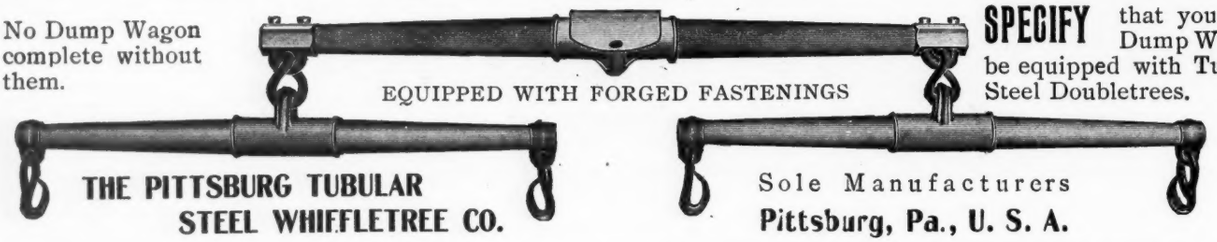
The Everlasting Tubular Steel Doubletrees

No Dump Wagon complete without them.



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SPECIFY that your new Dump Wagons be equipped with Tubular Steel Doubletrees.

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SHADBOLT AND DAY'S DUMP WAGONS ARE EQUIPPED WITH TUBULAR STEEL DOUBLETREES

THE SHADBOLT NEW DUMPING WAGON
For CONTRACTORS and MUNICIPAL USE.

The wagon shown here weighs about 2,800 pounds and contains 54 cubic feet, water measure, with the detachable wing-boards on. We build any size desired.

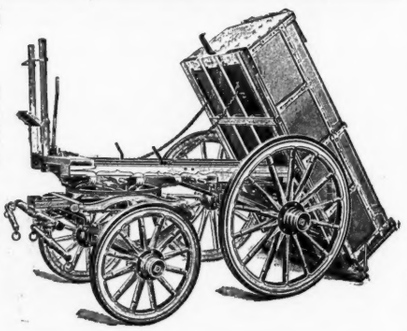
THIS new design meets the very general want of a simple, strong, moderate priced Dumping Wagon for Contractors and Municipal use. The body slides back on the frame and dumps; this being effected without use of rack or pinion. It is not possible for the crank to be forced out of the hand and *injure the operator.* It has no wheels or rollers to wear flat. The construction is such that the body can be brought back into position, after being dumped, very easily *with the tail-board on,* by one man. The load being properly distributed over both axles the *greatest ease of draft* is secured.

YOU WILL FIND DOLLARS IN
$HADBOLT$
FIRST AND LAST
In Efficient Service. In Economical Maintenance.

Dumping Wagons specially designed for Asphalt, Garbage and other special lines.

We also build the
CHARLTON STREET SWEEPER
which picks up the dirt as it sweeps, will cover 18 miles six feet wide per day with one pair of horses. Sweeps cleaner than hand work.

With the recent enlargement of our factory facilities by 20% and full up-to-date equipment, we are prepared to meet the increasing demand for our vehicles.



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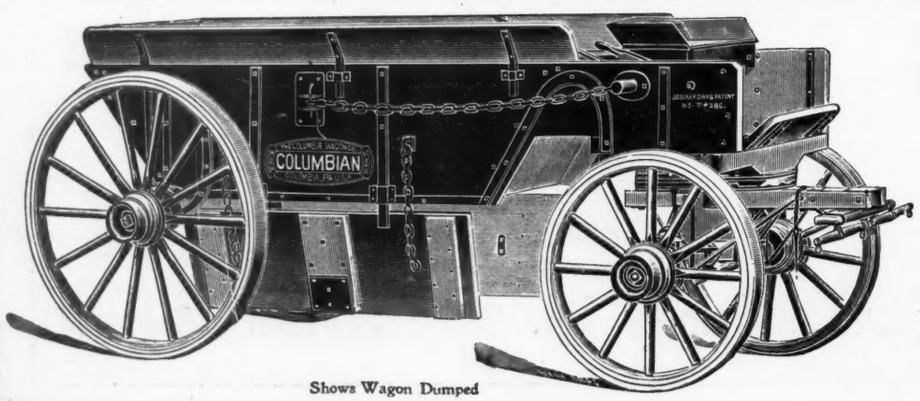

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Josiah F. Day Patent Dumping Wagon

We wish to call the trade's attention to the easiest manipulated drop bottom dump wagon on the market, as well as the strongest.

There are no hinges to get out of order, nor malleable iron to break, everything first class. We get them out in large lots and give particular attention to the contract trade.

Write us for prices and terms, it will pay you.

COLUMBIA WAGON CO.
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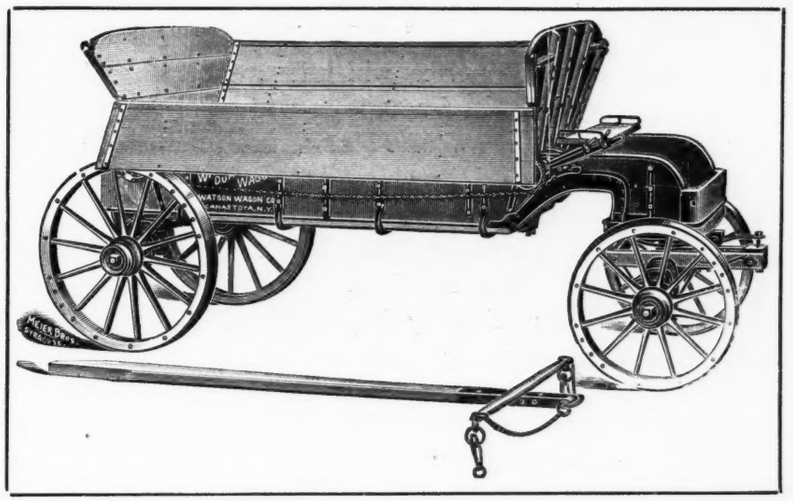
DUMPING WAGONS

FOR

ALL USES and ALL USERS



We make them for ashes and street sweepings in sizes of three, four, five, six and seven cubic yards capacity. They are in use and giving splendid satisfaction in a number of the largest cities in the country, including Buffalo, N.Y., Columbus, Ohio, Pittsburg, Pa., etc.

For General Contractors we make them in 1½ and 2 yd. sizes; for Asphalt Pavers we furnish them in 2 and 2½ yard sizes. The asphalt and ash wagons are mounted on coil springs and the asphalt wagons are lined with No. 16 patent Leveled Sheet Steel with asbestos between steel and wood to keep the heat IN the asphalt and OUT of the wagon.

All our bodies are made of Red Birch, tougher and stronger than oak, and our wheels are made of strictly second growth white oak spokes and rims.

No chains inside the box, strong solid elbow hinges bringing the bottoms up outside the sides; sides and ends straight up and down—no clogging.

Ask for Catalogue No. 2.

WATSON WAGON CO., Canastota, N. Y.

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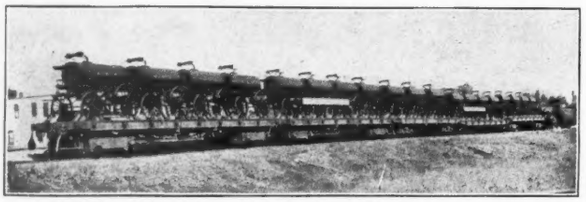
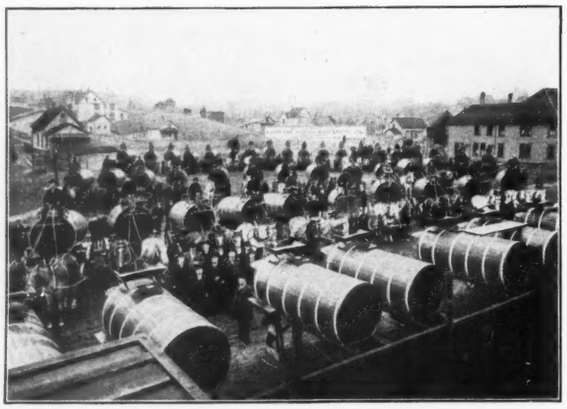
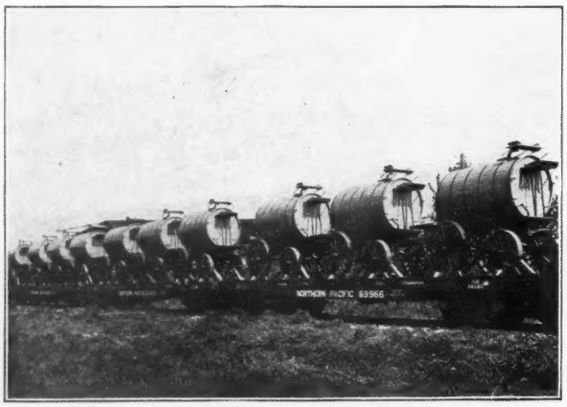


Train-load of Austin Sprinklers for the Parks of Greater New York.



Train-load of Austin Sprinklers purchased by the City of St. Paul, the largest single shipment of Sprinklers ever made by any one company.



Train-load of Austin Sprinklers purchased by the United States Government, for use in Yellowstone Park.

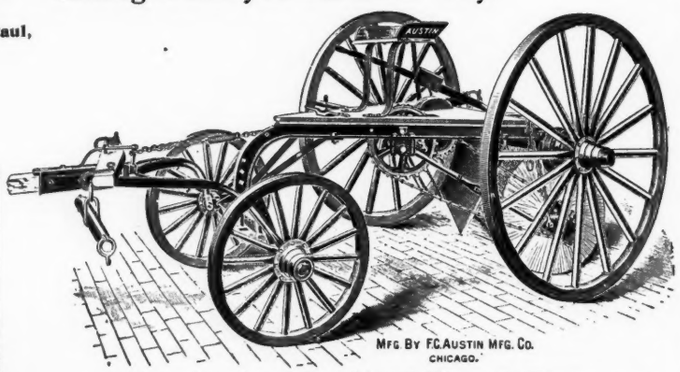
A few years ago we were selling **Austin Sprinklers** by car-loads. Now they go out by **Train-loads.**

Some of these train-load purchasers are: **The United States Government,** for use in the **City of Washington,** the cleanest city in America, which is swept and sprinkled by **Austin Sweepers and Sprinklers;** and for **Yellowstone Park,** the greatest Park in the World, in which **Austin Sprinklers** are used almost exclusively.

Greater New York gets a train-load every now and then, while all the large cities are continually buying them either in train-loads or numerous car-loads.

They are made in six sizes and seven styles, and are the best and most efficient Sprinklers that were ever on wheels.

We certainly are getting the cream of the Sprinkler trade. Send for our large illustrated catalogue and you will know why.



Also the **Austin Steel Street Sweeper,** used everywhere and liked everywhere. Used and endorsed by all the leading contractors and cities. Steel frames. No wood parts to rot out. Simple and durable in construction. No complicated or intricate parts to get out of order. Sold on approval. Fully guaranteed.

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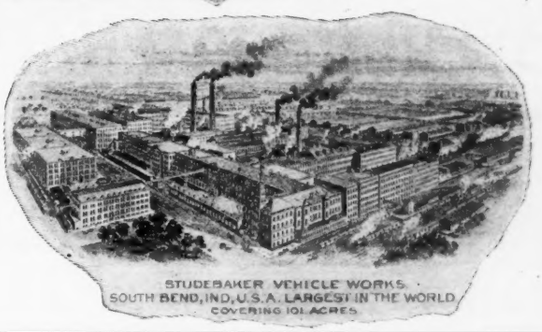

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The "Banner" Dump Wagon.

POSSESSES many features that particularly commend it to the City Contractor. The inside of the bed is clear of any obstruction, the automatic doors in the bottom being operated on the outside, which insures emptying the box completely when doors are opened. Doors, when released, are automatically lifted to the sides of the bed, consequently cannot catch in material dumped.

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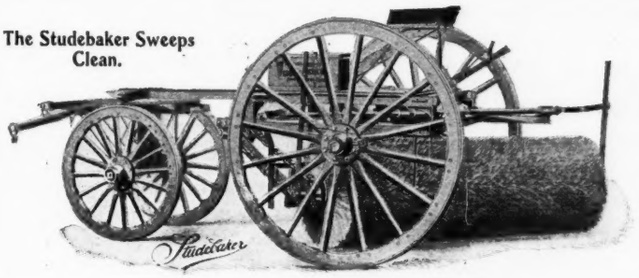

STUDEBAKER STANDARD STREET SWEEPER

Studebaker Standard Street Sweeping Machine.

THE brooms on these machines may be adapted by the driver to all kinds of street surface, from smooth asphalt to rough cobblestone pavement, a powerful lever at the right hand of the driver giving him perfect control of the brooms. All working parts interchangeable, the bearings self-oiling and protected from dirt.

Studebaker Improved Street Sprinklers.

OUR patent improved street sprinklers and sprinkling carts are furnished with vertical spray attachments. Any size of tank or style of gear. Each head is operated independently and affords any width of spray or desired volume of water, at will of driver.

There are more Studebakers in use to-day than all other makes combined.

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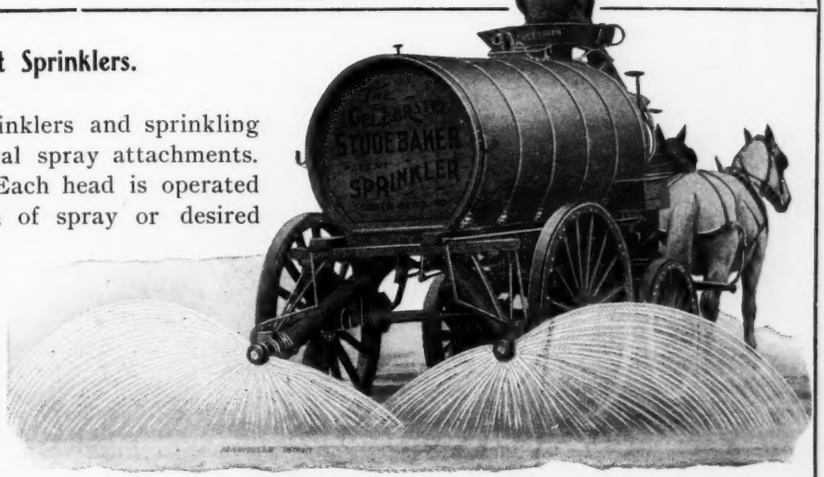

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A PAVEMENT that has merited the unstinted praise of civil engineers, city officials and taxpayers alike, and has given satisfaction wherever laid—has fairly won the title of **BEST.** We have laid Warren's Bitulithic Pavement in Port Huron, Bay City and Saginaw, Mich., Newport, Ky., and Ironton, Ohio, and have contracts in Manistee, Cadillac, Charlevoix, Mt. Clemence, Mich., and Cincinnati, Ohio. It is the ideal pavement. Information cheerfully furnished by

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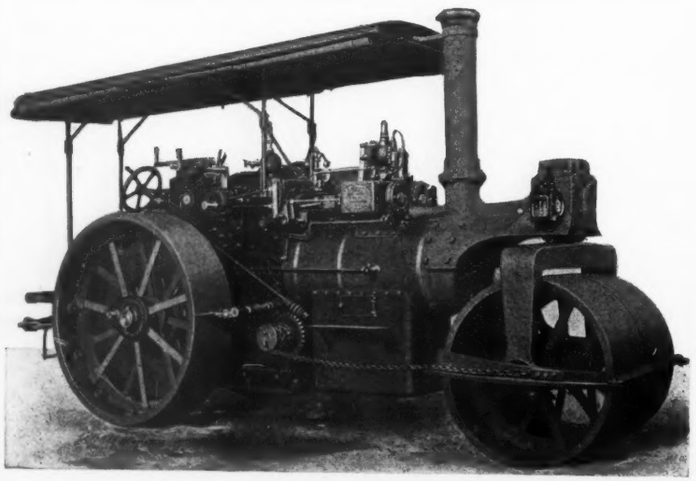
THE AMERICAN ROAD ROLLER CO.



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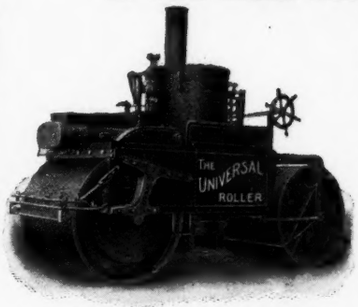
IN ALL SIZES FROM 8 TO 12 TONS. CATALOGUE No. 24



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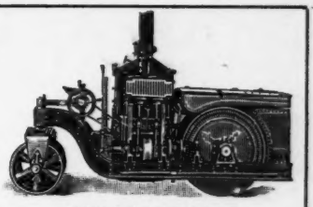
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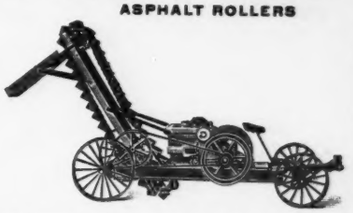

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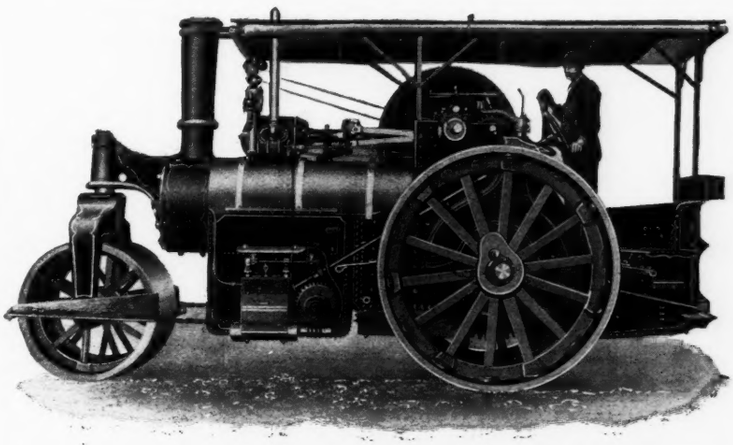

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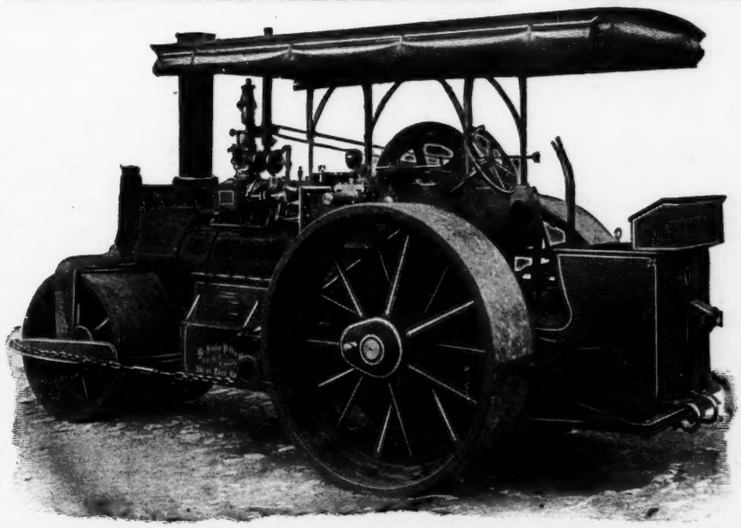

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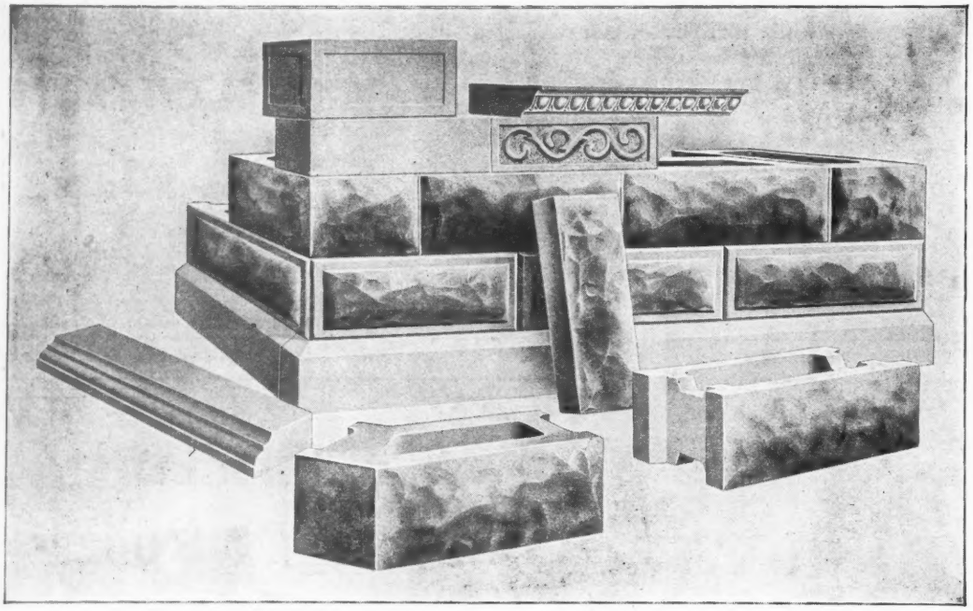
THE ONLY WAY TO MAKE PERFECT STONE



and produce it at less cost than an inferior grade can be produced is by tamping directly upon the face, using a composition of 2 to 1 for facing and 4 to 1 back thereof; by this method, you save cement and get a perfect reproduction and it is the only way you can get it.

THE

HERCULES

is the only hollow block machine that will produce hollow blocks, water table, window sills, lintels, coping, etc., of any size up to 5 feet long and 24 inches wide.

It is a radical departure in the cement block machine line.

Let us send you our proposition. You will become wiser and save much money by so doing. Write to-day.

THE CENTURY CEMENT BLOCK MACHINE CO.,

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MADE BY
THE C.O. BARTLETT & SNOW Co
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CONVEYORS AND ELEVATORS
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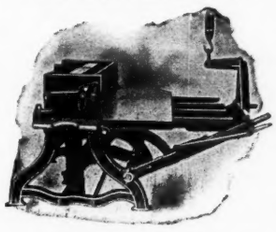

Normandin Block Machine.

Hollow Concrete Building Blocks

MANUFACTURED WITH THE

NORMANDIN BLOCK MACHINES

are in demand **because they are right.** Hundreds of machines and plants in operation throughout the U. S. and Canada and the Hollow Block business is permanent and **profitable, broadening** in extent every day. The following expression came to us unsolicited:

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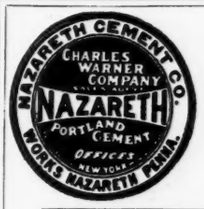
Gentlemen:—We used one of your machines last season and made up several thousand blocks. Many traveling salesmen have called on us showing other machines, but the "Normandin" is apparently the easiest worker and easiest handled machine on the market. We have not seen any machine that suits us as well; there are certainly no machines that are so rapid and we think any person buying one would be well pleased. Any time you have any customers for a machine, we would be glad to give them information.

Yours very truly,
STEWARD LUMBER CO., Scriver.

The leading lumber concerns of the U. S. are equipped with the Normandin. These Blocks sell right along with lumber as they are used for residences, factories, churches, etc. Send for Catalog "A".

Normandin Concrete Building Blocks.

Cement Machinery Co., JACKSON, MICH.



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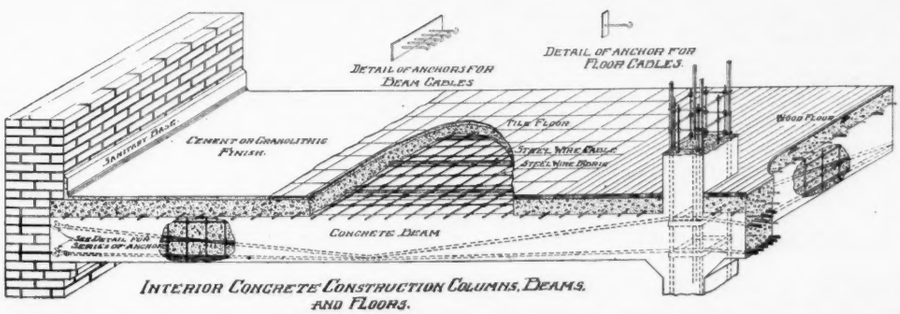

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Formulas for making and coloring stone in imitation of the products of all American quarries. Every hand and machine process described in all its details. A catechism of over 100 questions and answers on making and molding stone. Brief reviews of patents bearing on the subject, to which is appended a glossary defining words, phrases and terms peculiar to the trade.

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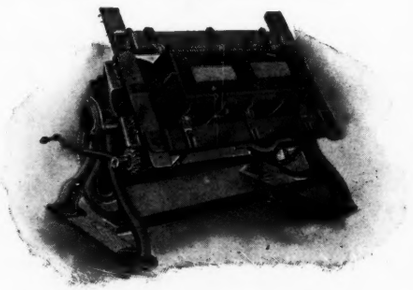
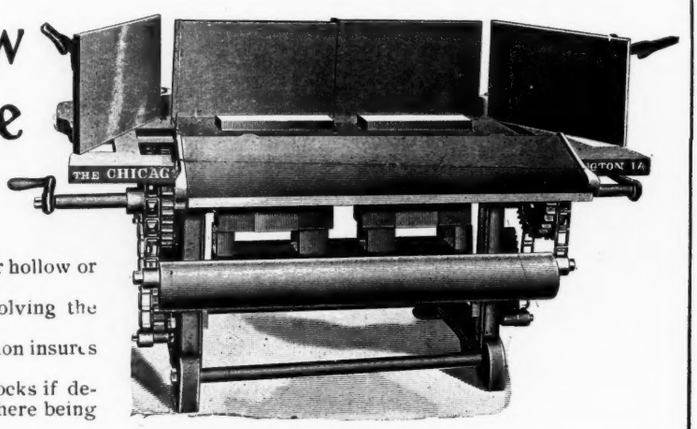
The Winget Machine for making hollow concrete building blocks is the only **AUTOMATIC, ADJUSTABLE** and **PERFECT** working machine yet produced. It is widely adjustable, making blocks for walls from four to eighteen inches thick, as well as many special designs. It is practically a combination of **TWENTY** machines in **ONE.** The saving of time, material and labor with this machine actually pays its price in a short time. If you are interested write for catalogue and special information.



MACHINE, SHOWING ROCKING POSITION FOR FACING.

Chicago Adjustable Hollow Cement Stone Machine



SHOWN OPEN.

SOME REASONS WHY THIS MACHINE IS SUPERIOR TO ALL OTHERS:

It can be Adjusted to make Blocks any Size or Shape either hollow or solid, required in building.

Forms the moulds and relieves the moulded block by simply revolving the gear attachments, thus avoiding all jar.

The faced plates being forced positively and accurately into position insures **Clean, Solid and Sharp Corners.**

Cores are Removable, so as to make solid and extra strong blocks if desired, or may be changed to make large or small openings in blocks, there being four different sizes.

By an ingenious adjustment of Machine, blocks can be faced with a half or three-quarters of an inch of extra strong concrete, in color if desired, greatly adding to their beauty and moisture-resisting power.

Four men with one Chicago machine can produce **200** perfectly formed blocks in ten hours, average size, 30x10x9, equaling **8000** bricks.

The Chicago Hollow Block Composition consists usually six parts sand, one part Portland Cement. Gravel or crushed stone may also be used for Filling. One barrel of Portland and one yard of sand will make **20 Blocks, Size 9 x 10 x 32,** equal to **800** brick.

Designs. Panels, concave, convex, moulded rock-face, brush face, chisel-face. Plain or highly ornamental blocks can be produced by simply attaching the proper face plate. The designs that can be moulded are unlimited.

Sizes. Blocks can be made from 4 to 18 inches wide and from 1 inch to 48 inches long, and 4 inches to 12 inches high, either hollow or solid. **Adjustment** for the different sizes is quick and simple.

Unless otherwise specified in contract, our Chicago machine consists of one complete machine for making sills, lintels, circle blocks, octagon blocks, corner blocks, flue blocks, pier blocks, and straight blocks—both hollow or solid.

We Also Manufacture the

Burlington Rotary Adjustable Hollow Cement Stone Machine with car system combined.
Burlington Rotary Cement Fence Post Machine with car system combined.
Burlington Cement Sewer Pipe Moulds.
Chicago Adjustable Sidewalk Block Machines.
Cast Bottom Plates for any machine on the market. **Burlington Cement Brick** Machine, cars and track for cement, block and brick plants. **Patent Solution** for making cement blocks and brick impervious to water.

We have equipped, during past year, some 50 plants in Kansas, Oklahoma, Texas, New Mexico, Missouri, Iowa, Nebraska, Illinois, Ohio, etc. **Get your** town in line.

THE CEMENT MACHINERY & MANUFACTURING COMPANY, Burlington, Iowa.
Western Distributors for the Celebrated Smith Concrete Mixer and Portland Cement.

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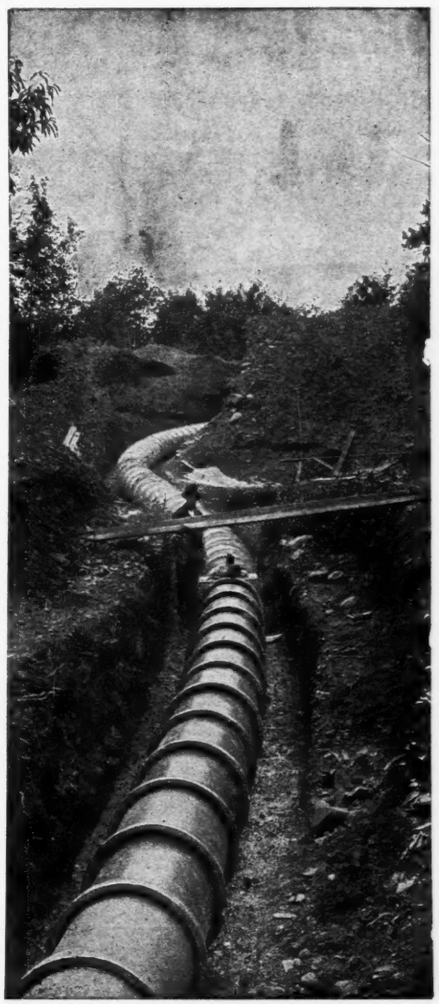
VITRIFIED WATER CONDUITS

SEWER PIPE

STANDARD
and
DOUBLE STRENGTH

Sizes, 2-inch to
36-inch



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DEEP and WIDE
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SPIGOT
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37 FACTORIES IN 5 STATES

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Double Strength Culvert Pipe

15 INCHES TO 36 INCHES FOR

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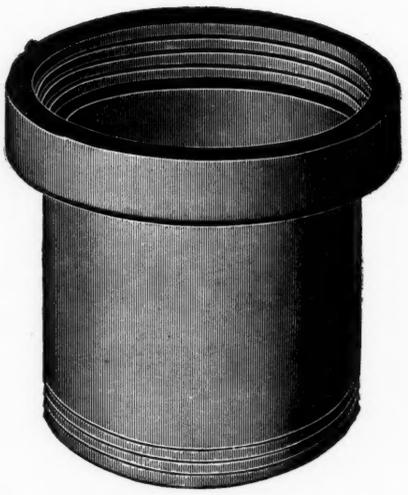
Standard Ohio Sewer Pipe



3 INCHES TO 36 INCHES
WITH STANDARD
DEEP AND WIDE
SOCKETS
IN 2 FEET, 2½ FEET AND
3 FEET LENGTHS

Flue Linings
Wall Copings
PAVING BRICK
Fire Brick
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ELECTRIC CONDUITS

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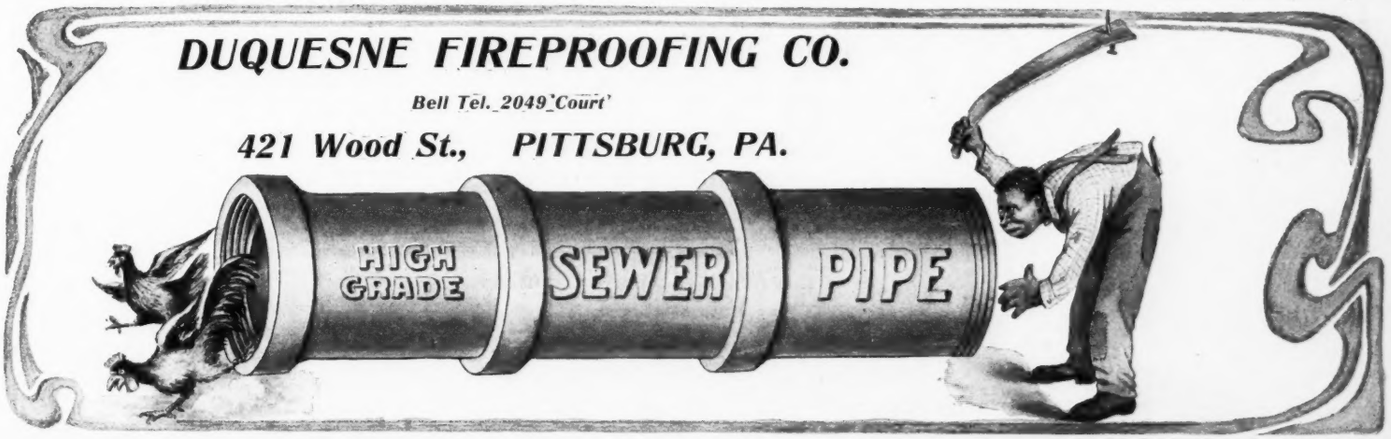
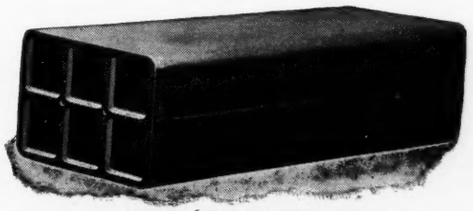


VITRIFIED CLAY CONDUIT



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SUPERIOR QUALITY
PROMPT DELIVERY

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MADE IN ALL SIZES

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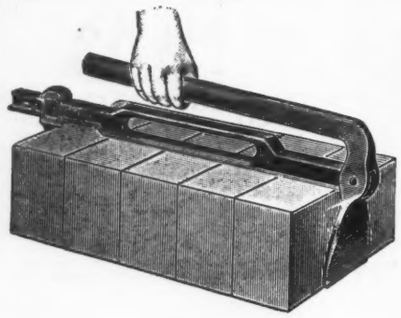

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The greatest labor-saving device ever offered to contractors.

A full line of cast iron supplies for street improvement.

Every article of new and improved design at reasonable prices.

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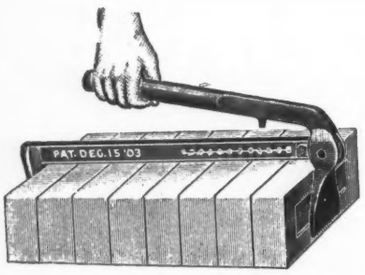

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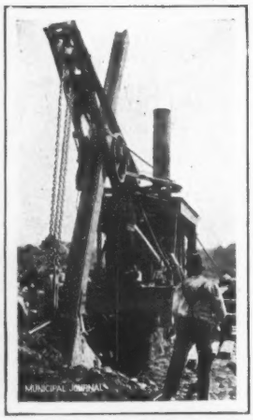

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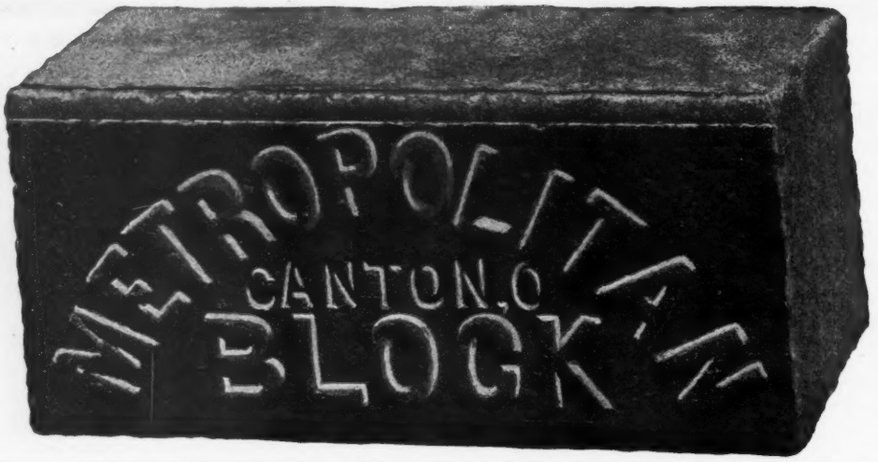

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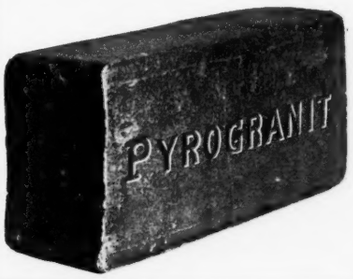

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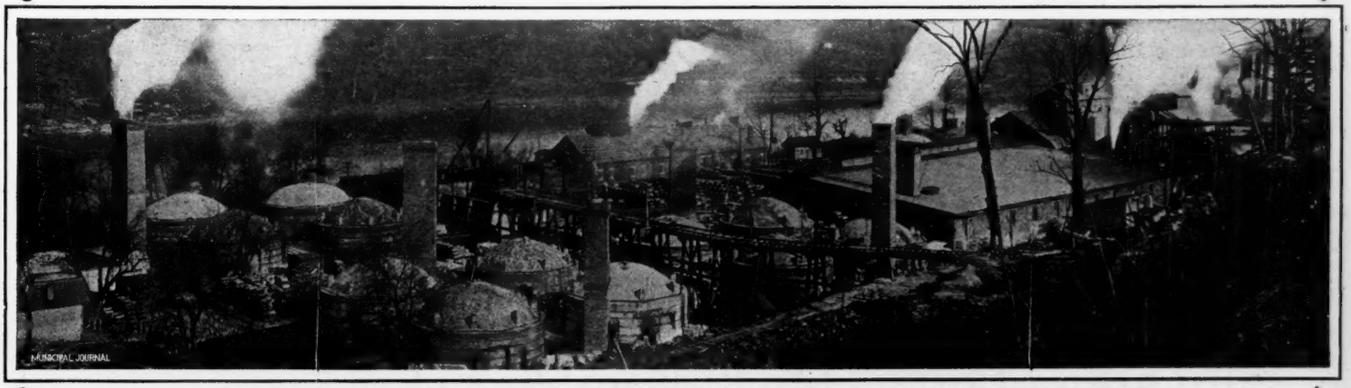

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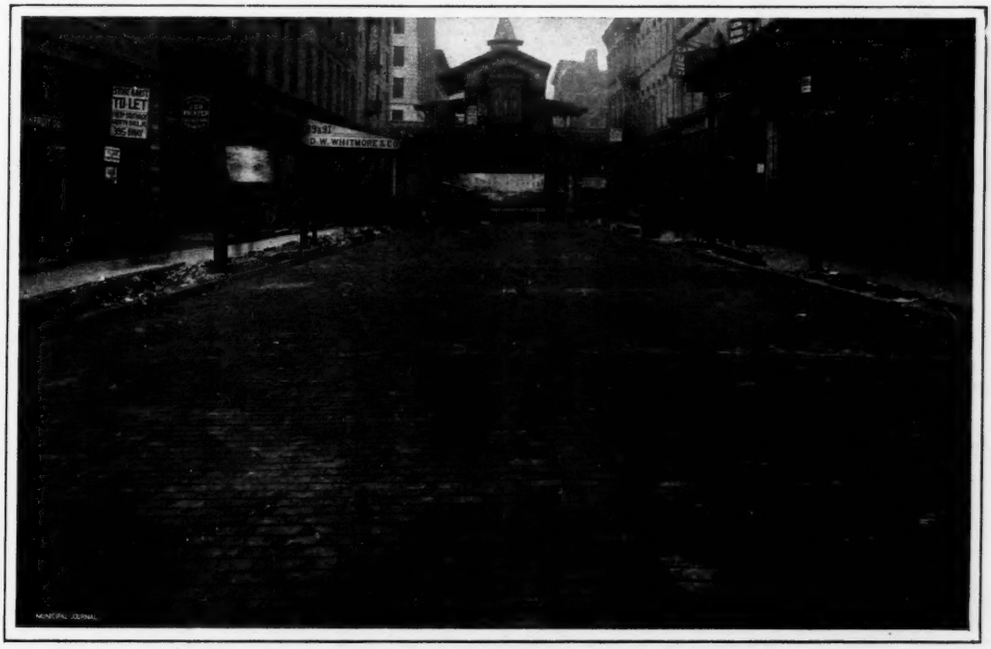

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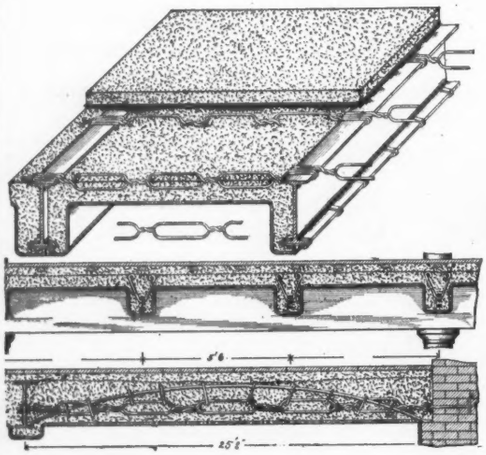

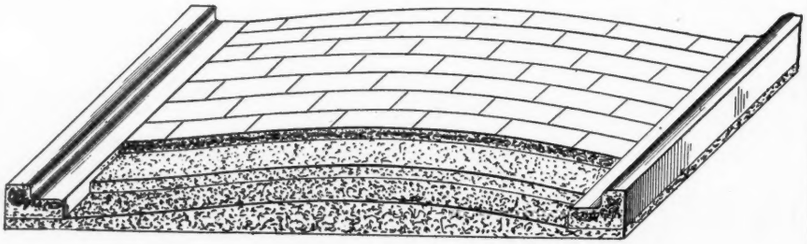

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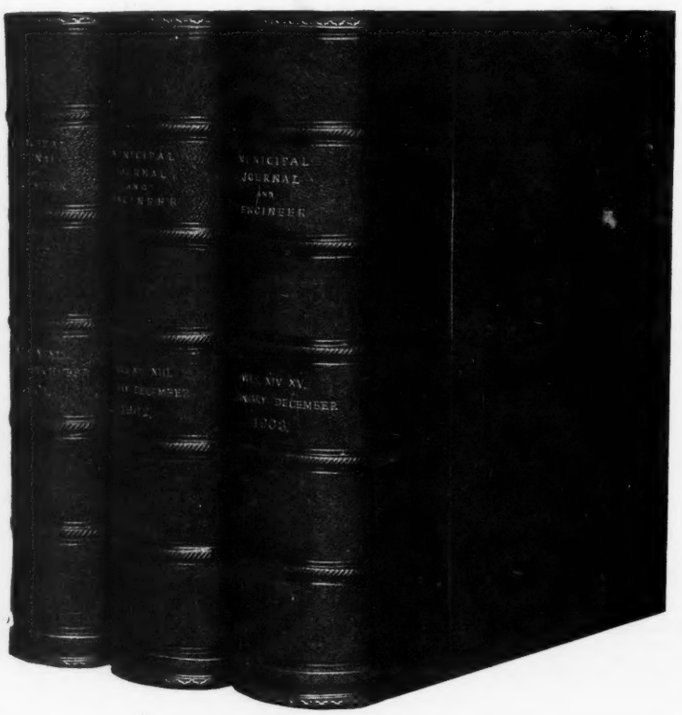

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